HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews not by Bureau staff are by A. E. Flood, N. H. Grubb, E. S. J. Hatcher, A. H. M. Kirby, F. W. M. Llewellyn, B. Mosse, S. C. Pearce, A. P. Preston, H. C. Ruck and M. C. Vyvyan of the East Malling Research Station, H. H. Glasscock of the N.A.A.S., W. Heydecker of the University of Nottingham and V. S. Summerhayes of the Royal Botanic Gardens, Kew.

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SALIENT ITEMS. Vol. 25. No. 2.

CULTURAL ASPECTS.

General:—The conservation of soil and water is fundamental to all forms of agriculture and it is therefore appropriate to start by drawing attention to a new American handbook on the subject (1246).

Crop spacing:—Planting two raspberry canes at each site instead of one and reducing the spacing between rows increased yields considerably (1380). Spacing also markedly affected the yields of glasshouse tomatoes (1773). It is difficult to believe that such essentially practical information has only just reached the light of day.

Tillage:—The results of an experiment on coffee are of particular interest in showing how yields are affected by weed competition (2167). A trial on tobacco shows the advantage of deep ploughing and also the importance of timing in turning under a green manure crop (1811).

Irrigation:—The relationships between the yields of various vegetables and temperatures and rainfall supplemented by irrigation over a 5-year period are described (1642). An automatic irrigation device which turns water on or off in response to soil moisture conditions is a promising innovation (1248).

DISEASE AND PEST CONTROL.

Incidence and importance:—In the March number of *H.A.* reference was made to the relatively small amount of work done on the ecological and economic aspects of host-parasite relations. The present number is better served in these respects. On the ecological side there are five papers which are concerned with the incidence of fungus or bacterial diseases in relation to climatic factors (1478, 1649), host nutrition (1789, 1996), soil management (1470) and method of applying irrigation water (1705). On the economic side there are sugar cane trials showing the average loss of crop caused by the ratoon stunting virus (2234) and two surveys designed to assess the damage caused in England and Wales by cabbage aphid (1666) and carrot fly (1746).

Fungi:—Of possible general interest are studies on the use of antibiotics or antagonistic fungi against parasitic fungi (1468, 1790), an attempt, so far unsuccessful, to determine whether any of the amino acids play a part in the resistance of apple varieties to scab (1462), and a suggestion that apple varieties susceptible to phytophthora collar rot should be double-worked using a resistant intermediate (1467). The toxic agent fusarinic acid, which is formed in tomato plants infected with *Fusarium lycopersici*, has been shown to have an inhibitory effect on tomato leaf tissue (1787). The neutralization of another toxin from *Phytophthora cinnamomi* is believed to account for the beneficial effects following spray applications of a fungicide to avocadoes (1997).

Insect pests:—A detailed account is given of the histological abnormalities formed in shoots of resistant and susceptible apples attacked by woolly aphid (1497). Aphids of the genus *Myzus* affected water relations in bird cherry shoots (1498) and transferred radioactive phosphorus from one tobacco plant to another (1826). A weevil infesting pea seed has been controlled by infra-red rays (1712).

Nematodes or eelworms:—Now that the burrowing nematode, *Radopholus similis*, has been shown to be the cause of the hitherto baffling slow decline disease of citrus in Florida considerable fire power has been directed against the pest (2039-2043). Some success is reported in three papers (1480-1482) in the reduction of nematodes in old orchard soils preparatory to replanting, but in two cases snags were also encountered. An attempt to control the root-knot nematode of tobacco by electrical means failed (1829). The discovery that *Aphelenchoides ritzema-bosi* can be seed-borne in aster introduces another complication in its control (1899).

Phytotoxicity of insecticides:—There is increasing evidence that many of the newer insecticides may under certain conditions affect plant growth adversely (1461, 1652, 1684, 1727, 1920, 1966, 2239).

Fruit storage:—Investigations on the use of new dips, wraps and liners to lengthen storage life and reduce decay are reported in two papers on apples (1359, 1360) and five on citrus (2050-2054).

FROST HARDINESS.

Some of the many external and internal factors involved in cold resistance are examined for a diverse assortment of trees and shrubs (1319, 1438, 1962, 1964, 1965, 2019). As a means of determining the winter hardiness of plants electrical conductivity tests appear to be of value in dealing with closely related types, but not for comparing different genera (1289, 1963). Freezing germinating seeds also has limitations as a method of eliminating susceptible seedlings (1288). Among methods of increasing cold resistance the use of weak concentrations of herbicides suggests interesting possibilities (1222). A hardiness survey of *Prunus* species grown on the Canadian prairies may also be mentioned (1295).

GROWTH AND FLOWERING.

Bud formation:—In *Ulmus campestris* the ability or otherwise of the cambial tissues to form buds is controlled by the ratio between adenine and inositol (1214).

Juvenility:—The not-so-cold war between Kemmer on the one hand and Passecker and Fritzsche on the other enters another round (1323). Two other workers contribute papers (1213, 1303) which have a bearing on the problem, but the second, by suggesting that phasically young seedlings can change their characteristics merely as a result of layering, scarcely simplifies the issue.

Top-root relations:—Two papers are concerned with the regenerative capacity of roots of apples (1307) and horseradish (1747). With young pear trees the system of formation pruning is shown to have a marked effect on the development of the root system (1334). The anatomy of bud unions in compatible and incompatible combinations are described for pear on quince (1312) and for roses (1947). Rootstock effects on scions are reported for the new Malling-Merton series of clonal apple stocks (1309) and for hevea rubber rootstocks raised from clonal parents (2193).

Strawberry growth and flowering:—Attention may be drawn to 4 papers (1384-1387) each of which contributes something new to our knowledge of the growth of this plant.

Flower bud initiation:—The already large sum of information on the effects of photoperiod and temperature on flowering in the chrysanthemum continues to mount (1902-1904) and on this occasion is supplemented by data on the chilling requirements of its relative, pyrethrum (1874). Other plants in which flower development can be controlled by regulating day-length are asters (1897), begonias (1917), kalanchoe (1941) and poinsettias (1984). A paper on citrus, though not concerned with flower initiation as such, may help to explain the mechanism of photoperiodic responses, in so far as it shows that with reduced day-length sugars in the leaves rise and their translocation is retarded (2021). In date palms inflorescence initiation in October is related to carbohydrate accumulation between June and October, which in turn is related to the leaf-fruit ratio during this period (2057). In deciduous fruits the period over which initiation takes place is found to be longer than is generally believed (1321). In tomatoes and beans treatment with triiodobenzoic acid increased flower production at the expense of growth (1699), but in sugar cane attempts to induce flowering with gamma radiation failed (2230).

Flower inhibition:—Maleic hydrazide can be used to delay or inhibit flowering in sugar cane (2228, 2229).

MACHINERY AND EQUIPMENT.

Machines and implements:—In addition to a general report by a Dutch working party on horticultural engineering in the United States (1198) and an account of mechanized strawberry cultivation in

Michigan (1388), descriptions are given of machines for preparing mushroom compost (1725), for staking and stringing runner beans (1700), for hedge pruning citrus (2000), for harvesting celery (1677), and for extracting manila hemp fibre (1861).

Sprayers and spray deposits:—Five papers are concerned with crop sprayers (1540-1542, 1656, 1657) and four with herbicide sprayers (1630-1633). An account of aerial oil-spraying of wattle plantations attacked by caterpillars can be found in two places (1882, 2306). The incorporation of fluorescent materials in spray solutions provides a means of showing up spray patterns and estimating deposits quantitatively (1547).

Harvesting and handling fruit:—Mention may be made of a cut and grip secateur for picking grapes (1411), a tool for picking up olives from the ground (2088), comparisons between apple picking baskets (1346), the bulk handling of apples from orchard to packing house (1349), two new apple, pear and plum graders (1350) and a system of mechanization employed in a grape packing house (1414).

Glasshouse structures and equipment:—Various aspects of construction and management are dealt with in a report from Wageningen (2297). A series of articles deals with dutch lights and their management (1260). Plastics as a subsitute for glass show promise, though there are still difficulties to be overcome (1266, 1267). Two papers deal respectively with glasshouse ventilation (1257) and the reliability of glasshouse thermometers (1255), and three others with soil sterilization methods and equipment (1262, 1263, 1265). The use of mercury compounds in greenhouse paints should be avoided (1952, 1953).

Apparatus and techniques:—Descriptions are given of a laboratory press for extracting plant sap (1209), a miniature roller for dealing with sample lots of tea leaves (2251), and, among papers noted by title only, apparatus for measuring plant transpiration (1275a), for measuring the intake by leaves of water from the atmosphere (1275k) and for collecting spores and pollen from the air (1275b). Formulae are given of solutions for preserving plant materials in their natural colours (2240). Plastics appear again, this time as pot labels (1271).

PLANT NUTRITION.

General:—The inadvisability of considering the NPK nutrition of plants without reference to other factors is shown in studies which relate responses to water supply (1644), light intensity (2127), growth phase of the plant (2084), rootstock (1308) and chloride concentration (2187).

Plant composition:—Seasonal variations in leaf composition are considered for citrus (2009), cacao (2125, 2126) and rubber (2196), and root and leaf compositions are compared for citrus (2008). A comprehensive review is available on the effects of environment on plant composition (1203). For the determination of organic constituents a new method of paper chromatography combines speed with efficiency of separation (1199).

Individual elements, mostly minor:—New pieces for the vast jigsaw puzzle of plant nutrition and metabolism concern the effects of boron (1224, 2010, 2024), calcium (1230, 1240), manganese (1241, 1775), strontium (1647) and sulphur (1648, 1732). Iron, however, continues to hold its own as the most fashionable of the minor elements (1242, 1243, 1430, 2013, 2014, 2104), and one of these papers (1243) introduces a new factor with the discovery that iron chelates are photosensitive.

Toxicities:—Plants can be poisoned by high soil concentrations of nickel (1816) or by the presence as impurities in fertilizers of biuret (2016) or perchlorates (2017).

PLANT PROPAGATION.

Seed:—The germination of lettuce seeds is considered in relation to various complex factors (1755-1758). The germination of pome and stone fruit seeds can be hastened by stratification on ice (1300) and of tomatoes by exposure to high frequency fields (1767). Flower seeds show various degrees of dormancy (1895) and some species germinate best after several years storage (1896).

Cuttings and related methods:—In a study on vines it is claimed that for the first time a definite relationship has been established between growth inhibitor content and rooting response (1396). Vines also figure in two more papers on the topsy-turvey, two-temperature stratification system known as "kiljčevanie" (1399, 1400). Cuttings taken in midsummer from male holly trees rooted better than those from female trees, a difference which is attributed to the depletion of carbohydrate reserves caused by fruiting in the latter (1976). It is possible that a similar carbohydrate factor was operative in a trial with tea cuttings in which shoots with the terminal bud just starting to grow rooted better than shoots with dormant terminal buds (2244). Mist propagation, in one case intermittent instead of continuous, is the subject of three papers (1954, 1955, 2118), and plastics of two (1956, 1989). A pit propagator for cacao cuttings (2121) and a general account of cinchona propagation may also be mentioned (2155).

Grafting:—A modified "nurse-root" system of grafting can be used to raise apple varieties on their own roots (1306) and root grafting can also be used to propagate coffee (2164).

Transplanting:—Plastics emerge yet again as wrapping films for the shipment of roses and other shrubs (1949, 1958) and as dips for aiding the transplanting of cacao seedlings (2124). The advantages gained from early pricking out of tomato seedlings draws attention to a rather different aspect of the transplanting problem (1770).

MISCELLANEOUS.

Apple-pear hybrids:—The use of hormones to produce these oddities is described (1293). They contain the phenolic substances typical of, and in some cases specific to, the two parents (1294).

Change of diet:—Anyone thinking of trying edible bamboos might receive guidance from 1660.

Gas:—This time domestic gas and the sensitivity of various house plants to it (1894).

Hope for tired lawn mowers:—Two more papers report good results with maleic hydrazide in checking the growth of lawn grasses (1936, 1937).

Woad:—Those wishing to escape for a few moments from present horrors might care to read a historical account of this plant, which meant much to our hairy ancestors but became extinct as a crop in England in 1924 (1883).

MISCELLANEOUS.

General.

1182. Rigg, Sir T.
Role of science in the development of New Zealand agriculture. Being presidential address to the Australian and New Zealand Association for the Advancement of Science, Canberra, Jan. 13th 1954, pp. 35.

Subjects of particular interest to horticulturists discussed by the author include the following: Trace element investigations with special reference to boron and molybdenum; the decrease in acreage coupled with enhanced quality of New Zealand orchards, and the work of the Cawthron Institute and the D.S.I.R. at Nelson on many orchard problems such as pests, diseases and storage; the growth of the tobacco industry; control of plant diseases and pests including work on biological control of weeds and on the vector of the phormium yellow leaf virus.

1183. Summerland [Mann, A. J., and Keane, F. W. L., editors].
[Tree fruit varieties, planting recommendations, hardy frameworks, rootstocks, pollination, nuts, grapes and small fruits.] 87 stencilled quarto or foolscap sheets in folder, Summerland exp. Stat., B.C., January, 1955.

All with special reference to B.C. the editors detail the characteristics of the different varieties or strains of the following tree fruits: apples, apricots, cherries, peaches, pears and prunes. They follow with planting recommendations, then with detailed notes on hardy frameworks and rootstocks. A sheet is devoted to pollination requirements of new plantings. Walnuts and filbert varieties are discussed. Finally the cultivation and varietal qualities of vines—mainly non-European or crosses—are set out, and a few notes are made on small fruits. [It is not known whether these valuable notes are generally available.]

1184. N.A.A.S.
Experiments in horticulture in progress at the Experimental Horticulture and Demonstration Stations 1954-55.
[*Publ.*] *N.A.A.S.*, 1 Cambridge Terrace, London, N.W.1, pp. 67.

The bare bones of work in progress at Luddington, Stockbridge, Rosewarne, Efford, Fairfield, Kirton, and at the Demonstration Stations at Trawscoed, Bryn Adda and Cleppa Park on top and soft fruits, vegetables in the open, flowers in the open, bulbs and corms, glasshouse crops, glasshouse design, protected crops and various nutritional problems.

1185. Voelkel, H.
Feierliche Übernahme der Biologischen Zentralanstalt in Berlin durch die Bundesrepublik Deutschland. (**The Biologische Zentralanstalt, Berlin, taken over by the German Federal Republic.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 129-31, illus.

In June, 1954, the Biologische Zentralanstalt, Berlin, was taken over by the German Federal Republic and thereby officially linked with the Biologische Bundesanstalt für Land- und Forstwirtschaft, Braunschweig, and its branches in Western Germany. Henceforth, the parent institute of the German plant protection service will be called *Biologische Bundesanstalt für Land- und Forstwirtschaft*. Its history and research programme were discussed in speeches delivered at the taking-over ceremony.

1186. Goidanich, G.
L'Istituto della Sperimentazione Agraria nella nuova sede di Madrid. (**The National Agricultural Experiment Institute in its new headquarters in Madrid.**)
Ital. agric., 1954, **91**: 926-32, illus.

A description is given of the new headquarters of the Instituto Nacional de Investigaciones Agrícolas at Madrid. It houses the headquarters' staff and the laboratories of the Plant Pathology Station, the Agronomy Station, the Agricultural Engineering Station, the Cereal-growing Centre, the Ampelographic and Viticultural Centre and the national registry of varieties.

1187. Cabello de Fina, A. G.
El cincuentenario de la Estación Experimental Agronómica. (**The 50th anniversary of the [Santiago de las Vegas] Agricultural Experiment Station.**)
Rev. Agric. Habana, 1954, **37** (2): 29-37.

The activities of this Experiment Station have included tobacco breeding, work on the control of citrus black fly (*Aleurocanthus woglumi*), the establishment of a herbarium and an arboretum, sugar cane research, and the introduction of medicinal and aromatic plants such as camomile and citronella.

1188. Janaki Ammal, E. K.
The scope and functions of the reorganized Botanical Survey of India.
Sci. and Cult., 1954, **20**: 275-80.

The Survey's functions include the revision of Hooker's flora, compilation of a history of Indian botany, a search for new plants in and outside India, desert flora studies, encouragement of tree planting, study of the Himalayan flora and co-operation with Kew.

1189. Programa Cooperativo de Experimentación Agropecuaria.
Diccionario de plantas cultivadas, hierbas silvestres y malas hierbas en el Perú. **(Glossary of cultivated, wild and weed plants of Peru.)**
[*Publ.*] *Programa Cooperativo de Experimentacion Agropecuaria*, Av. Republica de Chile 664, F Lima, Peru, 1954, pp. 56.

This useful glossary contains the Peruvian names of some 500 species in Spanish-English-Latin, English-Spanish-Latin and Latin-English-Spanish. There are many spelling errors in the English and scientific names.

1190. Milano, V. A., and Marzocca, A.
Las plantas cultivadas en la Tierra del Fuego. (**Plants cultivated in Tierra del Fuego.**)
Idia, 1954, No. 80, pp. 3-40, bibl. 53, illus.

This special number of *Idia* is entirely devoted to an account of the plants cultivated in Tierra del Fuego, Argentina. Notes on the physiography, phytogeography, climate and soils of the region are followed by an annotated list of the cultivated plants by families. Both botanical and Spanish common names are given. The plants include coniferous and other trees and shrubs for ornamental and windbreak purposes, top and small fruits, vegetables, flowers, and miscellaneous and greenhouse plants.

1191. Papadakis, J.
Informe ecológico sobre las provincias de Mendoza y San Juan. (**Ecological report on the provinces of Mendoza and San Juan.**)
Idia, 1954, No. 76, pp. 2-15, bibl. 8, illus.

An account is given of the climate, soils and natural vegetation of the Mendoza and San Juan provinces [of Argentina], an arid region subject to spring frosts. Graphs and tables provide information on the amount of water in the main rivers at various seasons, early and late frosts, temperature, rainfall and the irrigation needs of mesophytic crops. Recommendations are made on the growing of top fruits, vines and vegetables. Apples, pears, walnuts and chestnuts can be grown on exposed sites, vines, peaches, plums and olives on selected sites, and cherry and apricot only in the most frost-free spots.

1192. Singh, S.
Horticultural crops as bee pasture.
Indian J. Hort., 1954, **11**: 49-52, bibl. 3.

Short notes are supplied on a large number of temperate and tropical fruits, vegetables and ornamentals considered as sources of nectar and pollen for bees.

1193. Bailey, I. W.
Contributions to plant anatomy.
Chron. Bot., 1954, $9\frac{1}{2} \times 6\frac{1}{2}$ in., **15** (1/6): 1-262, bibl. 169, illus., $7.50.

This is a collection of 20 papers written by the author at different times and published originally in different journals. Briefly they concern cytology and ontogeny (5), biochemistry and biophysics (6), phylogeny (2), taxonomy (3), entomology (1), paleobotany (1), wood technology (1) and co-operation in scientific research (1).

1194. Leick, E.
Grundsätzliches zur Taumessungsfrage. (**Fundamental aspects of the problem of dew measurement.**)
Kulturpfl., 1953, **1**: 53-78, bibl. numerous.

The importance of exact dew measurement for plant studies is emphasized and various methods are discussed.

Statistical design.

1195. Hoblyn, T. N., Pearce, S. C., and Freeman, G. H.
Some considerations in the design of successive experiments in fruit plantations.
Biometrics, 1954, **10**: 503-15, bibl. 8.

Part I (*General*). (*a*) The design of new experiments with fruit trees is discussed and some general considerations are advanced. (*b*) The circumstances in which subsequent trials are possible are discussed. (*c*) Possible designs are set out for a subsequent trial on the same material where the initial design is in randomized blocks. (*d*) Attention is given to the designing of initial trials, so as to permit most readily of the addition of further sets of treatments. *Part II.* (*Examples of changing treatments.*) Examples are given of some of the methods set out in Part I, using orthogonal and non-orthogonal designs both for the single changing of treatments and for repeated changing. [Authors' summary.]—E. Malling Res. Stat.

1196. Healy, M. J. R.
Statistical techniques for inspection sampling.
Trop. Agriculture, Trin., 1955, **32**: 10-19.

It sometimes happens in agriculture as in industry that a succession of batches has to be examined to decide which shall be accepted and which rejected, e.g. in germination tests on batches of seeds. This paper describes three methods of sampling, single, double, and sequential, that can be used to effect economies, and it does so from the point of view of the non-mathematician who wants to make practical use of these methods.
S.C.P.

Labour and mechanization.

1197. Bennett, L. G.
Labour productivity in horticulture.
Agriculture, Lond., 1955, **61**: 515-19.

Means of assessing labour productivity on horticultural holdings are dealt with, and 3 ways of improving the productivity of the staff are discussed, namely work simplification, incentive payments, and the provision of adequate fertilizers and power.

1198. van den Muijzenberg, E. W. B. (Editor).
De tuinbouwtechniek in Amerika. (**Report of a working party on horticultural engineering in the U.S.A.**) [English summary 4 pp.], [1954?], pp. 181, bibl. 209, illus., fl. 5.

The authors consider developments in mechanization and discuss the directions in which such developments could be utilized under Dutch conditions.

The English summary is clear and factual and could certainly be read with considerable interest and advantage by English readers. It is issued by the Contactgroep Opvoering Productiviteit, Wageningen, Holland.

Biochemistry.

(*See also* 2280.)

1199. MATTHIAS, W.
Über ein papierchromatographisches Verfahren für Serienuntersuchungen in der Pflanzenzüchtung. (**A method of paper chromatography devised for serial studies in plant breeding.**)
Züchter, 1954, **24**: 313-16, bibl. 7, illus.

A consideration of the usual methods of paper chromatography led the author to the conclusion that no method so far published combines speed and convenience with efficiency of separation. He therefore devised a procedure in which the suitability for multiple repetition of the ascending strip technique is combined with the efficient separations obtained in circular chromatography (Rutter, Giri and others). For this purpose the paper of an ordinary strip chromatogram is cut at the lower end so that it tapers to a very narrow bridge, which then expands again to form a small tongue. The spot of the sample to be analysed is placed at the point where the bridge expands into the tongue and the solvent is allowed to diffuse up the strip by dipping the lower end of the tongue in the solvent mixture. It is important to apply the spot at the lower point of the bridge so that, as the solvent ascends, a homogenating effect occurs during the time the solvent travels up the bridge, and then, subsequently, the components of the mixture being separated appear as arcs (instead of the spots or rings of the usual techniques) on the upper portion of the sheet. Thus the efficiency of separation of the circular technique is preserved whilst at the same time up to 100 strips (28 × 4 cm.) can be run at one time in one chromatographic chamber (48 × 29 × 29 cm.). The application of the method to quantitative analysis is to be described in a further publication. A.E.F.

1200. BISSET, S. K.
The non-protein nitrogen of extracts of *Pisum sativum*.
Biochem. J., 1954, **58**: 225-7, bibl. 10.

The extraction was made by cold and hot saline solutions and by hot and cold water. Results achieved lead to the conclusion that, for a complete extraction of non-protein N from peas, hot saline-buffer extraction followed by trichloroacetic acid precipitation is the best procedure. The methods are described.

1201. PAYNE, M. G., FULTS, J. L., AND PULESTON, H. S.
Effect of uracil on amino acids in ultraviolet-irradiated plants.
Bot. Gaz., 1954, **115**: 386-8, bibl. 5.

Paper-chromatographic studies of 11 free amino-acids in pea seedling juice showed that uracil treatment of pea seedlings partially or completely protected the acids from ultraviolet radiation damage. [From authors' summary.]

1202. FARKAS, G.
Cukrok mérgezö hatása o növények gyökereire. Cukorantagonizmusok. (**The toxicity of various sugars to plant roots. Sugar antagonisms.**) [English, Russian and German summaries.]
Agrokem. Buda., 1953, **2**: 341-52, bibl. 22, illus.

Galactose and to a smaller extent the structurally related arabinose were the only sugars toxic to roots of germinating plants. A list of 17 species susceptible to galactose is given. Symptoms of root injury and effects on germination are described. Galactose appeared to have no effect on the metabolism of green leaves. When the antagonism of related compounds to galactose activity was tested, it was found that glucose and sugars which may readily be converted to glucose, such as fructose, sucrose, maltose, cellobiose, retarded or completely inhibited toxicity.

1203. SOUTHERN COOPERATIVE GROUP. (RICHARDSON, L. R., AND OTHERS.)
Influence of environment on the chemical composition of plants. I. A review of the literature.
South. Coop. Ser. Bull. **36**,* 1954, pp. 198, bibls numerous.

This bulletin presents a comprehensive review of the literature relating plant composition to soil and climatic factors. The roles of the various nutrients in the plant, the mechanism of formation of certain of the organic constituents, as well as the factors affecting the accumulation of the various nutrients in the plant, are also considered. Subjects dealt with by various authorities include the effect of environment on the plant contents of ascorbic acid, carotene, riboflavin, thiamine, crude fibre, ether extract, calcium, magnesium, potassium and sodium, and iron. There is also a paper on factors affecting absorption of micronutrient elements and their interrelationships in plant nutrition.

1204. SERGEEV, A. V.
Carotene in some wild plants of Yakutia. [Russian.]
Priroda, 1954, **43** (12): 101, bibl. 2.

Among 8 plants analysed, the edible fruits of wild rose, Siberian mountain ash, Siberian hawthorn and black currant were found to have a high carotene (provitamin A) content, and are therefore considered to have a great nutritional value for the local population.

1205. CORRENS, E.
Über den Aneuringehalt höherer Pflanzen in Abhängigkeit von Tageslänge und Lichtfarbe. (**On the aneurin content of higher plants in relation to length of day and colour of light.**)
Biol. Zbl., 1955, **74**: 87-105, bibl. 34.

The aneurin content of young and old leaves was determined in many species of short-day, long-day and day-neutral plants, most of them horticultural.

1206. TOWERS, G. H. N.
The keto acids of plants: their identity, analysis, and metabolic roles.
Diss. Abstr., 1954, **14**: 1903, being *Publ.* 9785 of 286 pp.

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* Obtainable from Agric. Exp. Stats of Georgia, Mississippi, N. Carolina, Oklahoma, Puerto Rico and Texas.

A new procedure for recognition and analysis of keto-acids of plants has been devised. Pyruvic, oxaloacetic and α-ketoglutaric acid were found, as expected, to be present in the plants studied. Glyoxylic acid was found to be commonly present in green leaves, roots, bulbs and tubers. Among hitherto unidentified keto-acids, α-keto-γ-methyleneglutaric acid was found in tulip, *Lilium* sp. and *Humulus*. Variations in keto-acid content were studied using mint leaves and phloem tissue of carrot root. Long-day mint plants were characterized by a high content of α-ketoglutaric acid. The general level of keto-acids in tissue cultures of carrot was markedly increased by the presence of coconut milk growth factors.

1207. Kinzel, H., and Url, W.
Katalasebestimmungen an grünen Blättern unter Berücksichtigung des Säurefehlers. **(Catalase determination in green leaves with regard to errors caused by acids.)** [English summary 1 p.]
Physiol. Plant., 1954, **7**: 835-50, bibl. 25, illus.

Using *Tradescantia guianensis*, *Begonia conchifolia*, *Oxalis floribunda*, *Saxifraga sarmentosa*, and *Echeveria elegantissima.*—Pflanz. Physiol. Inst., Univ. Wien.

1208. Seifter, E.
The occurrence of coenzyme A in plants.
Plant Physiol., 1954, **29**: 403-6, bibl. 8.

Coenzyme A was found to be present in many flowering and non-flowering vascular plants. A comparative table is given of the coenzyme content of some plant tissues including that of apple fruits, brussels sprouts, cabbage, carrot, hevea seed, kok saghyz, lettuce, onion, orange fruits and spinach. [See also *H.A.*, 24: 2144.]

1209. Crowdy, S. H., and Pramer, D.
The occurrence of translocated antibiotics in expressed plant sap.
Ann. Bot. Lond., 1955, **19**: 79-86, bibl. 7, illus.

The details of a convenient laboratory press are presented and a procedure by which plant sap is readily obtained is described. The pressing procedure has been shown to release 53–74% of the total plant water as expressed sap. Preliminary observations on the uptake and translocation of antibiotics by higher plants [including broad bean, cabbage, lettuce and tomato] obtained by examining expressed sap are described. It is shown that the assay of expressed sap provides a measure of the griseofulvin and chloramphenicol concentration in leaves of plants grown in solutions of these antibiotics that does not differ significantly from the value obtained by the assay of water extracts. Extraction of leaves from plants grown in griseofulvin solutions with organic solvents demonstrates a much greater antibiotic content than is indicated by the assay of expressed sap. To explain this difference a "free" antibiotic fraction, obtained in expressed sap or water extracts, and a "bound" fraction recovered from the leaf only by organic solvent extraction are postulated. [Authors' abstract.]—I.C.I., Butterwick Res. Labs, Welwyn.

Physiology.

(*See also* 1275a, j, y, 1498, 2262, 2270.)

1210. Yemm, E. W., and Willis, A. J.
Stomatal movements and changes of carbohydrate in leaves of *Chrysanthemum maximum*.
New Phytol., 1954, **53**: 373-96, bibl. 41, illus.

A study of diurnal movements of the stomata of *Chrysanthemum maximum* [shasta daisy] has been made by means of porometer measurements of leaf resistance and by examination of epidermal strips. Estimates of sugars and starch were made on the epidermis and on the mesophyll, with the main object of investigating the relation between diurnal fluctuation of carbohydrates and the stomatal mechanism. The water relations of the plant were shown to have a marked effect on both stomatal movement and metabolism of carbohydrates in the guard cells. The chief results were as follows: (1) A highly significant correlation was demonstrated between starch content of the guard cells and pore width or leaf resistance. (2) Stomatal opening in the morning was associated with a decrease of starch and increase of sugars in the epidermis together with a fall in water content of the leaf. (3) Closure of the stomata occurred when the water deficit exceeded 5% of the water content of the fully turgid leaf. (4) Stomatal closure was associated with an increase of starch in the guard cells, but there was no corresponding fall in the sugars of the epidermis. (5) The total carbohydrates of the epidermis showed a marked diurnal fluctuation which was in some respects similar to that of the mesophyll. It is suggested that the diurnal movements of these stomata under natural conditions are mainly determined by the water relations of the leaf tissues and carbohydrate changes in the guard cells. [Authors' summary.]—Dep. Bot., Univ. Bristol.

1211. Kružilin, A. S., and Švedskaja, Z. M.
Physiological changes in biennial plants in the process of phasic development when grafted on annuals. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **98**: 487-90, bibl. 7.

When young cabbage and carrot seedlings were grafted on white mustard and dill respectively they flowered and produced seed the same year. The processes of phasic changes were found to be directly connected with changes occurring in the metabolites. The peroxidase activity is higher in the leaves of annuals than in those of biennials and by grafting the latter on the former the activity of this ferment was accordingly increased in the biennials. The monosaccharose and amino acid contents in the leaves of biennials were also increased by grafting on annuals.

1212. Spear, I., and Thimann, K. V.
The interrelation between CO_2 metabolism and photoperiodism in *Kalanchoë*. II. Effect of prolonged darkness and high temperatures.
Plant Physiol., 1954, **29**: 414-17, bibl. 8.

Kalanchoë blossfeldiana plants were given an inductive cycle of short days, and then held in prolonged darkness to fix CO_2. When the temperature was raised to 30° C. a large quantity of CO_2 was evolved. Subsequent exposure to light at 20° C. resulted in a further, but smaller, evolution of CO_2. Plants given the minimum induction period of short-day cycles, but kept at different temperatures during the dark period, showed a decreased flowering response at high temperatures. Exposure to a single very long dark period after a non-inductive cycle caused little or no CO_2 fixation and little CO_2 evolution on subsequent exposure to light.—Harvard Univ., Mass.

1213. SCHAFFALITZKY DE MUCKADELL, M.
Juvenile stages in woody plants.
Physiol. Plant., 1954, **7**: 782-96, bibl. 67, illus.

The author considers that juvenile phases represent clearly separate phases between seedling and adult stages. They may be characterized by shape and/or physiology of leaves, by the occurrence of certain shoot-types or types of phyllotaxis, or by sterility. A well-defined juvenile stage has stable characters by which it is distinguishable from preceding and subsequent stages. The author reviews the literature on juvenile stages in Cupressineae, fruit and forest trees. His experimental work has shown that there is a well-defined juvenile stage in *Fagus sylvatica*, the main characteristic of which is the ability to retain most of the withered leaves during the winter.—Arboretum, Hørsholm, Denmark.

1214. JACQUOIT, C.
Action du méso-inositol et de l'adénine sur la formation de bourgeons par le tissu cambial d'*Ulmus campestris* cultivé *in vitro*.
(The effect of meso-inositol and adenine on bud formation by cambial tissue of *Ulmus campestris* cultured *in vitro*.)
C.R. Acad. Sci. Paris, 1951, **233**: 815-17, bibl. 1.

Inositol and adenine are the factors causing bud formation in *Ulmus campestris*. In summer inositol is apparently the limiting factor, and an increase in the adenine/inositol ratio inhibits bud formation. In winter adenine appears to be the limiting factor. Results indicate that it is the variation in the adenine and inositol content of the tissue which affects the seasonal variation in the budding ability of the cambial tissue.

1215. ROSENE, H. F.
A comparative study of the rates of water influx into the hairless epidermal surface and the root hairs of onion roots.
Physiol. Plant., 1954, **7**: 676-86, bibl. 15.

The water influx into root hairs of primary and adventitious roots of onion was measured and compared with absorption by localized hairless regions of adventitious roots. In general the average rates of water influx through the root hairs and hairless epidermal surface were similar.—Dep. Zool., Univ. Texas, Austin.

1216. KATZNELSON, H., ROUATT, J. W., AND PAYNE, T. M. B.
Liberation of amino-acids by plant roots in relation to desiccation.
Nature, 1954, **174**: 1110-11, bibl. 7.

Previous experiments showed that in the rhizosphere there is a preferential stimulation of bacteria requiring amino-acids for maximum growth [see *H.A.*, 13: 1445 and 20: 1758]. An investigation designed to explain this phenomenon showed that the roots of young tomato (and other) plants grown in a mineral solution liberate small quantities of amino-acids, and that the quantities increase strikingly when the roots are allowed to dry and then remoistened, a process which would occur under field conditions. In further experiments it was found that appreciable amounts of amino-nitrogen were elaborated in sand which was dried and remoistened in the presence of the plant root system, but not in sand treated similarly after the plants had been removed. The amino-acids recorded are listed.

1217. MELIN, E., AND RAMA DAS, V. S.
Influence of root-metabolites on the growth of tree mycorrhizal fungi.
Physiol. Plant., 1954, **7**: 851-8, bibl. 11.

Roots of *Lepidium sativum*, *Medicago sativa*, *Cannabis sativa*, and *Triticum aestivum* all produced metabolites which increased the growth rate of *Boletus variegatus* and *B. elegans* in a nutrient medium. Pea roots initially had a growth-promoting influence on *Rhizopogon roseolus*, but later a strong growth-inhibiting effect.—Inst. physiol. Bot., Univ. Uppsala.

Growth substances.

(*See also* 1275r, 1293, 1328-1332, 1396, 1409, 1410, 1421, Weeds and weed control section, 1658, 1679, 1699, 1739, 1757, 1777, 1800, 1936, 1937, 1972, 2065, 2123, 2214, 2247, 2282.)

1218. RAKITIN, JU. V.
The stimulation of physiological processes in plants. [Russian.]
Nauč. Sess. Vopr. Biol. seljsk. Hoz., Riga 1951, Moscow 1953, pp. 268-98, bibl. 3½ pp.

A critical review setting the Soviet concept of the function of growth regulators in the life of the plant against that professed by the West, and discussing the mode of action of chemical stimulators. All the well-known properties of growth substances made use of in propagation, fruit production, storage and weed control are mentioned.

1219. WEINTRAUB, R. L., BROWN, J. W., AND THRONE, J. A.
Relation between molecular structure and physiological activity of plant growth regulators. II. Formative activity of phenoxyacetic acids.
J. agric. Food Chem., 1954, **2**: 996-9, bibl. 11.

The formative activities of approximately 145 ring-substituted phenoxyacetic acids were measured by the bean leaf repression technique. The presence of a halogen atom at position 4 appears to be a requisite for high activity. [From authors' summary.]

1220. BRIAN, P. W., AND OTHERS.
The plant-growth-promoting properties of gibberellic acid, a metabolic product of the fungus *Gibberella fujikuroi*.
J. Sci. Food Agric., 1954, **5**: 602-12, bibl. 25.

Gibberellic acid, added to nutrient solutions in concentrations up to 10 μg./ml., increased the growth of wheat and pea seedlings grown in water culture. Increasing the concentration did not increase the response and very high concentrations proved inhibitory. With pea seedlings the main effects were marked elongation of stem internodes and increases in total dry weight due principally to increased carbon assimilation. Treated plants contained more soluble carbohydrate than the controls, the increase in glucose content being particularly striking. Gibberellic acid had no effect when tested against several bacteria and fungi. In soil it underwent rapid breakdown.—I.C.I. Butterwick Res. Lab., Welwyn.

1221. Gorter, C. J.
The flowering response of *Phaseolus vulgaris* to 2.3.5-triiodobenzoic acid and its Cl- and Br-analogues.
Proc. kon. ned. Akad. Wetensch., Ser. C, 1954, **57**: 606-16, bibl. 27, illus., being *Publ. Lab. Tuinbouwpl. Wageningen* **124.**

A series of experiments with Vroege Wagenaar bean plants in pots was designed to evaluate their response to soil applications of 2,3,5-triiodobenzoic acid (TIBA) and its halogen substitutes TClBA and TBrBA. There was a general reduction in vegetative development of treated plants, usually the newly-formed and actively growing organs only being affected. Plants also shed their terminal buds, but the increase in flower production was not a result of loss of apical dominance. At all concentrations of TIBA used (20–100 mg./l.) the number of flowers was increased. Treatment with equimolar concentrations of the benzoic acids showed that TClBA and TBrBA increased flower number at lower concentrations (0·4–1·0 Mol.) and decreased flower number at higher concentrations (1·0–2·0 Mol.). At lower concentrations the sequence of activity was Cl > Br > I. In another experiment flowers were counted and removed every 7 days for 9 weeks, starting 11 days after the last application of the benzoic acids. Results showed that flower production in treated plants was higher than in the controls for the first 4–5 weeks, but then dropped to a lower rate. The total flower production was only increased at high rates of TClBA and TBrBA. The increase in flower production in these experiments was not directly correlated with the reduction in leaf area or fresh weight. The author concludes that these substances do not act as "anti-auxins" in their effect on flower formation in bean.

1222. Corns, W. G., and Schwerdtfeger, G.
Improvement in low temperature resistance of sugar beet and garden beet seedlings treated with sodium TCA and Dalapon.
Canad. J. agric. Sci., 1954, **34**: 639-41, bibl. 2.

Sugar-beet and garden-beet seedlings were grown in darkness and high humidity for 6 days at approximately 21·5° C. in Petri dishes containing vermiculite moistened with a standard volume of water or with 4 to 8 p.p.m. active concentration of TCA (sodium salt of trichloroacetic acid) or of Dalapon (sodium salt of 2,2-dichloropropionic acid). Shoots were then cut off and attached basally to horizontal bands of Scotch tape on a wire frame and rotated slowly during controlled exposures to −10° C. for periods of 5 to 10 minutes. Such treatments revealed highly significant improvement in cold resistance of chemically treated seedlings as judged by numbers of seedlings surviving their exposures in the freezer. [Authors' abstract.]—Univ. Alberta, Edmonton.

1223. Fischnich, O., Pätzold, C., and Thielebein, M.
Anwendung von Maleinsäurehydrazid bei einigen Kulturpflanzen. **(The application of maleic hydrazide to some cultivated plants.)**
Angew. Bot., 1954, **28**: 88-113, bibl. 75, illus.

The action of maleic hydrazide was studied in a series of experiments on food and ornamental plants. Tubers of Jerusalem artichoke [*Helianthus tuberosus*], which were already formed when the plants were sprayed, remained dormant in store for longer than normal. Applications to some root crops and onions after flowering or after the storage organs had been formed affected plant growth only slightly, but prolonged the dormancy of the storage organs. Direct treatment of artichoke tubers and carrot and turnip roots also inhibited sprouting. Bolting of lettuce and spinach was inhibited to a certain extent by MH sprays under short day conditions, but the treatment reduced the market value of the crops. Flowering of apple and wild cherry was not delayed by MH treatment.

1224. Mitchell, J. W.
Absorption and translocation of some organic compounds by plants.
From abstr. in *Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954,* New York, pp. 1-2, bibl. 1.

Many organic compounds are known to be readily translocated upward but relatively few are translocated downward. It was found that the downward movement of such compounds as 2,4-D is associated with the downward transport of sugars and possibly other products of photosynthesis. Recently it was discovered that boron accelerated the movement of sugars and it has been shown since that this direct effect of boron on sugar transport can influence indirectly the rate of translocation of 2,4-D and some other growth-modifying compounds from the leaves to the stems of bean plants. The ability of α-methoxyphenylacetic acid to be translocated downward and then to move out of the roots of a treated plant into those of an untreated one is mentioned [see also *H.A.,* 24: 1110].

1225. Tureckaja, R. H.
The absorption and distribution of radioactive iodine used in a growth stimulator on cuttings.
[Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1954, No. 4, pp. 35-41, bibl. 3, illus.

Cuttings of bean and potato, soft and hard wood cuttings of poplar and willow and soft wood cuttings of lemon were treated with radioactive *p*-iodophenoxyacetic acid by immersion. In the woody species the maximum I^{131} accumulation occurred in the base of the stem where the roots were formed. In the herbaceous cuttings I^{131} was translocated to the upper part of the stem; later, vigorous root formation was observed in that region. The largest amount of I^{131} in all plants was found in the xylem, then in the bark and least of all in the buds. The lower leaves of soft wood willow cuttings contained much radioactive material and those of poplar slightly less. Only very little was translocated into the leaves of bean, potato and soft wood lemon cuttings. Application of the growth stimulator improved rooting in all cases.

1226. Rebstock, T. L., Hamner, C. L., and Sell, H. M.
The influence of 2,4-dichlorophenoxyacetic acid on the phosphorus metabolism of cranberry bean plants (*Phaseolus vulgaris*).
Plant Physiol., 1954, **29**: 490-1. bibl. 10.

When the first trifoliate leaves of young bean plants in pots were unfolding, the soil was treated with 2,4-D. Six days after treatment the plants were harvested and their P content was estimated. The total P content of leaves of treated plants was less than that of untreated plants. The total P content in the stem tissue was higher in treated than untreated plants. There was little difference in the P content of treated and control roots.

1227. Marrè, E., Teubner, F. G., and Murneek, A. E.
Growth and phosphorus metabolism in tomato ovaries. I. Changes in phosphorus fractions.
Amer. J. Bot., 1954, **41**: 722-6, bibl. 13.

Growth was induced in tomato ovaries by pollination or by treatment with the ethyl ester of indoleacetic acid. Growth during the first 2 days was more active in the auxin-treated than in the pollinated ovaries, but after fertilization this situation was reversed. Protein synthesis was proportional to the increase in fresh weight in the stimulated ovaries in the first 2 days, but subsequently it was far exceeded by the increase in fresh weight. The concentration of hexose phosphate increased in the growing ovaries, and decreased in the non-developing lanolin-treated controls. Inorganic phosphate concentration did not significantly change at first, but decreased between the second and fifth days in both the fertilized and auxin-treated ovaries. Acid insoluble P increased in stimulated ovaries during the first 2 days.—Univ. Missouri.

1228. Nance, J. F., and Shigemura, Y.
Studies on acetaldehyde evolution and utilization.
Amer. J. Bot., 1954, **41**: 829-32, bibl. 20.

Aerobic evolution of acetaldehyde is promoted by auxins, antiauxins, 2,6-dichlorophenolindophenol, and propionate in wheat roots, corn stems and pea stems. Wheat coleoptiles placed in the same solutions produce acetaldehyde only in the propionate solutions. Azide and ethanol solutions were tested with wheat roots only and found to cause acetaldehyde evolution. Acetaldehyde utilization by wheat roots is inhibited by all concentrations of IAA and TCA that have an effect. Utilization of the aldehyde by wheat coleoptiles and pea stems is stimulated by IAA and TCA at 1×10^{-5} M and inhibited by higher concentrations. These results are discussed with particular reference to the mechanism of auxin action. [Authors' summary.]

1229. Hanson, J. B., and Bonner, J.
The relationship between salt and water uptake in Jerusalem artichoke tuber tissue.
Amer. J. Bot., 1954, **41**: 702-10, bibl. 42.

The relation of auxin-induced water uptake to the uptake and accumulation of ions has been investigated with tissue of the Jerusalem artichoke tuber. It has been found that 2,4-D has no effect on the process of salt uptake, but has at least three indirect effects on this process. When auxin and RbCl are supplied simultaneously to the tissue, there is a slight promotion of rate of Rb uptake which can be related to increased tissue hydration. When tissue is pretreated with auxin prior to introduction of salt, rate of active salt uptake is considerably reduced as compared with the rate in non-treated tissue. The reduction is attributed to a competition between salt and water uptake for a common energy supply. It can conversely be shown that the uptake of salts inhibits rate of water uptake. Finally, auxin-pretreated tissue manifests an increased capacity to gain Rb in the initial hour of absorption. This has been interpreted as signifying an increased cation exchange capacity of the tissue resulting from increased growth. [Authors' summary.]—Calif. Inst. Tech., Pasadena.

1230. Gorter, C. J.
Nutrition and auxin-production in seedlings of *Raphanus sativus* and *Zea mais*.
Proc. kon. ned. Akad. Wetensch., Ser. C, 1954, **57**: 617-20, bibl. 4.

The production of auxin by radish and maize seedlings depended on the composition of the nutrient solution. Those grown in distilled water formed little or no auxin. There was a remarkable decrease in auxin production by radish when grown in a nutrient solution without calcium nitrate. The absence of other nutrients had no effect on auxin production, though plant development was retarded.—Lab. Tuinbouwpl. Wageningen.

1231. Cooke, A. R.
Changes in free auxin content during the photoinduction of short-day plants.
Plant Physiol., 1954, **29**: 440-4, bibl. 16.

Measurements were made of the auxin content of several short-day plants, including tobacco, stock, calendula and zinnia. A decrease in auxin content was shown to be associated with flowering but was not the cause of flower initiation. [See also *H.A.*, 24: 2150.]

1232. Nolte, H.-W.
Untersuchungen über die stofflichen Grundlagen der Gallenbildung. (**Studies on the chemical basis of gall formation.**)
Reprinted from *Verh. dtsch. Ges. angew. Ent.* **12.** *MitgVers.*, 1954 [?], pp. 124-8, bibl. 7, illus.

The author's experiments show that plant galls caused by gall midges are induced by growth substances similar to β-indoleacetic acid. It is still uncertain whether these substances are in the first instance secreted by the midge or whether they are taken up with the food from the plant host and then secreted in a concentrated form.

Tissue cultures.

1233. Boll, W. G.
Studies on the growth of excised roots. V. Growth of excised roots of two inbred lines of tomato and their reciprocal crosses in media supplemented with various growth factors.
New Phytol., 1954, **53**: 406-22, bibl. 9, illus.

An alternative technique to that described earlier [see

H.A., 25: 57] was used in this study. Growth was compared in media containing combinations of the growth factors thiamin, pyridoxin, niacin and glycine. The results obtained are reported in detail and their possible significance with regard to the genetic and metabolic control of growth is discussed.—Dep. Bot., Univ. Manchester.

1234. Boll, W. G.
Inhibition of growth of excised tomato roots by desoxypyridoxin and its reversal by pyridoxin.
Science, 1954, **20**: 991-3, bibl. 9.

Inhibition effects on excised tomato roots by several levels of desoxypyridoxin (DOP) were completely reversed by increased concentrations of pyridoxin. At increased DOP concentrations, when the ratio of DOP to pyridoxin remained constant, the main axis growth decreased; this phenomenon was not observed in lateral root growth. The growth of the main axis was significantly greater at a DOP: pyridoxin ratio of 10: 3 than at any concentration of pyridoxin alone.—Plant Res. Inst. Univ. Texas, Austin.

1235. Steward, F. C., Caplin, S. M., and Shantz, E. M.
Investigations on the growth and metabolism of plant cells. V. Tumorous growth in relation to growth factors of the type found in coconut.
Ann. Bot. Lond., 1955, **19**: 29-47, bibl. 12, illus.

It has been shown that aqueous extracts of plant tumours, induced by *Agrobacterium tumefaciens* on *Bryophyllum* and *Kalanchoë*, will act in place of coconut milk using the carrot tissue-culture procedures previously described [see *H.A.*, 22: 1139, 2112 and 23: 1473, 1474]. The activity of the tumour extracts was consistently greater than the activity of extracts of stems and leaves of the same plants and of normal non-tumorous plants. The growth-promoting effect of coconut milk, which is replaceable wholly or in part by tumour extracts, is primarily an effect on cell division in the carrot tissue. The bearing of these results on tumour formation in plants is discussed. [From authors' summary. See also VI of this series by Shantz and others, *ibidem*, 19: 49-58, bibl. 9.]—Cornell Univ., Ithaca.

Nutrition.

(*See also* 1275e, g, k, s, 1430, 1431, 1433.)

1236. Schlichting, E.
Bemerkungen zur Ausdeutung von Blattanalysen. (**Comments on the interpretation of the results of leaf analysis.**)
Plant and Soil, 1955, **6**: 92-6, bibl. 6.

The author briefly discusses some effects of manuring on nutrient content and antagonisms in the leaf, as indicated by leaf analysis.

1237. Tombesi, L.
Moderne vedute sul problema della fertilizzazione. Dieci anni di ricerche di fisiologia e biochimica applicate. (**Modern views on the problem of fertilization. Ten years' research on applied physiology and biochemistry.**) [English summary ½ p.]
Ann. Sper. agrar., 1954, **8**: 1775-93, bibl. 18.

This paper is concerned with the conclusions to be drawn from recent biochemical studies on fertilization at the Agricultural Chemistry Experiment Station, Rome, and the bibliography refers entirely to papers, many of them on tobacco, published by the author in 1949–53. According to the integral theory of fertility propounded by Tommasi, Marimpietri and Morani the maximum production attainable by a plant is a function of its environment and its NPK requirements, but in interpreting the physiological and biochemical phenomena of fertilization the plant's cell metabolism rate and enzyme content must be taken into consideration. The concept of a plant as the sum of a set of chemical principles must be allied to new concepts which concern the dynamic equilibrium of metabolic reactions and recognize that these chemical principles result from a complex chemical system, in which there are always present adequate supplies of enzymes of a temporary structure which, with the environmental conditions, govern the production of organic substances.

1238. Betto, E.
L'applicazione degli isotopi radioattivi in biologia vegetale. (**The use of radioactive isotopes in plant biology.**)
Reprinted from *Bull. Agric.**, 1954, No. 22, pp. 18, as *Pubbl. Ist. Pat. veg. Milan* **44.**

This review, which has incomplete bibliographical references in the text, covers the characters and methods of use of radioactive isotopes, absorption and translocation of nutrient elements, photosynthesis, study of fertilizers, minor element nutrition, entomological research, herbicide studies and plant pathology.

1239. Baldacci, E., Betto, E., and Amici, A.
Ricerche sull'impiego del P^{32} nella fisiologia e patologia dei vegetali. I. (**Research on the use of P^{32} in plant physiology and pathology. I.**)
Reprinted from *Boll. Soc. ital. Biol. sper.*, 1953, Vol. **29**, No. 7, pp. 3, bibl. 2, as *Pubbl. Ist. Pat. veg. Milan* **45.**

In a study of radioactivity in plants, P^{32} in the form of $NaHP^{32}O_4$ was supplied either through the roots or to the aerial parts by Roach's method (*A.R. East Malling Res. Stat.*, 1937, pp. 150-2) to 2-month-old seedlings of *Solanum nicotiana*, *Capsicum annuum* and *Datura stramonium* growing in a nutrient solution without P. The apparatus used—a Geiger-Muller tube—is described. P absorption varied with the method of application. With root application maximum absorption occurred after 10–12 days at 20–27° C. in good natural light, subsequent behaviour varying with species and the greatest concentration of P being in the apical leaves. With Roach's method maximum absorption was reached in a very short time and distribution in the leaves was apparently related to phyllotaxis.

1240. Mosolov, I. V., Lapšina, A. N., and Panova, A. V.
Translocation of radioactive calcium Ca^{45} in plants when applied to the foliage. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **98**: 495-6.

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* *Bullettino dell' Agricoltura.*

In a plant of high organic acid content (*Nicotiana rustica*) no translocation of calcium took place, but in one of lower organic acid content (clover) calcium was translocated upward.

1241. Corrie, F. E.
Manganese deficiencies in plants. Their occurrence, recognition and control.
Reprinted from *Fertil. Feed. St. J.*, 1954, being paper presented at *8th int. Congr. Bot., Paris*, 1954, pp. 7, bibl. 59.

An interesting and useful account of occurrence, recognition and control gleaned from extensive reading and study of current research.

1242. McCauliff, E.
Chelates in plant nutrition.
Agric. Chemls, 1954, **9** (12): 55, 109, 111.

General notes are given on the use of chelates in plant nutrition, either as foliage sprays or applied directly to the soil. Crops which have responded favourably to chelates include avocados, pineapples, bananas, pears, various vegetables, herbs, grasses, ornamental trees and flowers. It is suggested that some synthetic chelates might regularly be included in fertilizers to compensate for the depletion of humus, the source of natural chelating agents in the soil.

1243. Hill-Cottingham, D. G.
Photosensitivity of iron chelates.
Nature, 1955, **175**: 347-8, bibl. 6.

Inconsistencies in the chemical analysis of ferric-EDTA and other iron chelates for total iron were shown to be due to decomposition of the compounds on exposure to daylight. In quantitative laboratory experiments it is therefore necessary to protect iron chelate solutions from the action of light. The discovery of the photosensitivity of iron chelates suggested the hypothesis that the ferric-EDTA molecules are translocated to the leaves where reduction takes place to give rise to the less stable ferrous compounds. Then the iron could be removed more readily by complex formation with proteins or could be replaced by some other metal ions. Experiments are in progress to test the significance of the photosensitivity of iron chelates in plant nutrition.—Long Ashton Res. Stat.

1244. Reinhold, J.
Versuche zur Verbesserung der Stickstoffwirkung im Kompost durch Zugabe verschiedener Stickstoff-Düngerformen. **(Studies on the improvement of nitrogen action in compost by the addition of different forms of nitrogen fertilizer.)**
Arch. Gartenb., 1954, **2**: 441-61, bibl. 4, illus.

Calcium cyanamide, urea, calcium ammonia, sodium nitrate and ammonium chloride were added to partially rotted vegetable waste and their effects studied several weeks later. The physical and chemical properties of the composts were evaluated, and pot and field experiments with spinach were carried out. It was concluded that cyanamide application to the compost gave the best results. The physiological action of N in this compost was very good, and spinach yields were highest when it was used.

1245. Geissler, T., and Baumann, E.
Ein Beitrag zur Frage der Kompostierung von Stroh mit verschieden hohen Kalkstickstoffgaben. **(A contribution to the problem of composting straw with different quantities of calcium cyanamide.)**
Arch. Gartenb., 1954, **2**: 462-84, bibl. 14, illus.

A compost was made of straw and soil in the proportion of 3: 1, to which P, K, and varying amounts of N were added. The physiological characteristics of the composts were tested in plot and field experiments. Results showed that the most satisfactory compost after 6 and 12 months storage was that to which 0·35 kg./cu.m. of N as calcium cyanamide had been added. Applications of N above this rate led to yield reductions.

Soil management and irrigation.

(*See also* 1275m, 1339-1345, 1373p, 1405, 1408, 1788.)

1246. United States Department of Agriculture.
A manual on conservation of soil and water.
Agric. Handb. U.S. Dep. Agric., Soil Cons. Serv. **61,** 1954, pp. 208, illus., 60 cents.

An understanding of the basic principles of conserving soil and water is fundamental to the lay-out and management of all crops. This handbook is not concerned with individual crops, unless one includes woodlands and pastures under that heading, but it does deal very clearly and concisely with the factors causing soil erosion, the classification of land as suitable for various purposes and techniques for preventing and controlling gullies, terracing, stripcropping, cover-cropping, pasture and rangeland improvement, conservation irrigation and soil drainage. Anyone proposing to develop land for annual or perennial crops in areas subject to erosion or to faulty drainage or to both would almost certainly obtain many useful hints from a study of this inexpensive manual.

1247. Jensen, M. C., Hagood, M. A., and Fanning, P. K.
Irrigation structures and methods for water control.
Ext. Bull. St. Coll. Wash. Pullman **491,** 1954, pp. 32, illus.

In this extremely clearly illustrated bulletin simple instructions are given under the following, among other, heads: materials; land levelling; conveyance and holding of water in ditches, pipes, division boxes; drop structures and checks; applying water by border irrigation, furrow and corrugation irrigation, contour-furrow irrigation; maintenance of ditch banks; siphon tubes; spiles; the use of gated surface pipe; sprinkler irrigation; desilting and screening water.

1248. Bouyoucos, G.
Irrigating scientifically.
Market Grs' J., 1954, **83** (12): 16-17, 38, illus.

A description is given of the plaster of paris, electrical resistance method of soil moisture determination, and of a new method which automatically applies water when the soil needs it and turns it off when the proper amount has been applied. The automatic irrigation device consists of a nylon unit, a solenoid valve which turns the water on and off, and an electric controller. It has been used effectively for about 4 years, both in the greenhouse and in the field, and is being further improved.—Mich. agric. Exp. Stat.

1249. Postal, D.
Elettroirrorazione in collina con impianto fisso di distribuzione. (**Spraying in the hills with electric power and a permanent distribution system.**)
Ital. agric., 1954, **91**: 621-6, illus.

The system used in the province of Trentino is intended for steep country where vehicles and knapsack sprayers cannot be used, and it can be powered either by electricity or by an internal combustion engine. The underground distribution system has standpipes at intervals, and a length of hosepipe carrying a lance can be attached to these in turn.

1250. Unesco.
Reviews of research on problems of utilization of saline water.
Unesco, 19 Ave. Kléber, Paris 16^e, 1954, pp. 93.

Three articles are given in this report, viz. (I) The biological and agricultural problems presented by plants tolerant of saline or brackish water and the employment of such water for irrigation, pp. 9-35, bibl. 245, author G. Grillot. (II) Plant growth under saline conditions, pp. 37-71, bibl. 256, by H. E. Hayward, and (III) Utilization of sea water, pp. 73-91, bibl. 175, by E. D. Howe. A short index deals with all of them.

The author of (I) shows that published work indicates that (1) The direct toxic effect of a particular salt rarely, except occasionally in the case of magnesium salts, constitutes an obvious major problem. (2) The factor which does limit vegetation is the degree of total salinity. (3) It is the faulty composition of the water and hence of the soil solution which causes solonetzification and its attendant phenomena, viz. high pH, soil rendered increasingly impermeable and prevention of solution of nutrients. Solutions to the problems thus raised are summarized and very briefly are: (1) Identification and selection of species and varieties tolerant of high general salinity. (2) Use of brackish water of such a degree of salinity as is compatible with these species. (3) Selection only for irrigation with such water of areas in which the soil is permeable, well-drained and rich in calcium and the hydrates of iron and aluminium. (4) The maintenance of adequate dilution and satisfactory ion balance in the soil solution by means of calculation and checks. (5) Appropriate treatment to ensure adequate supplies of water available to plants while avoiding the accumulation of salts and solonetzification of the soil. Information is afforded in appendixes on the following among other subjects: classification of saline soils, sensitivity of cultivated plants, different problems relating to plants tolerant of saline water and the utilization of such water for irrigation. In Hayward's article (II) the toxic effects of specific ions are considered. Under the heading specificity in salt tolerance the characteristics of different crops in the face of salinity are discussed. Finally the scope of the problem is considered geographically, countries considered being Australia, India and Pakistan, Argentina and Chile, Peru and Ecuador, Brazil, Mexico, Canada and the U.S.A. The author of article (III) considers in detail the following methods of preparing sea water for use: multi-effect distillation, vapour compression distillation, temperature difference power plant, solar distillation, freezing, chemical processes, electrical methods, membrane methods.

Glasshouses and other structures.

(*See also* 1184, 1248, 1275h, t, 1428, 1638, 1655, 1762, 1763, 1769, 2279, 2297.)

1251. Berge, G.
Nya växthuskonstruktioner prövas vid Alnarp. (**New methods of glasshouse construction tested at Alnarp.**)
Horticultura, 1954, **8**: 197-202, illus.

A new block of glasshouses is being put up at Alnarp. The present, well-illustrated article deals mainly with the suitability of aluminium alloys for their construction.

1252. Gray, H. E.
Greenhouse heating.
Bull. Cornell agric. Exp. Stat. **906**, 1954, pp. 31, bibl. 6, illus.

Problems of greenhouse heating are discussed under the following headings: atmospheric conditions in the greenhouse, determination of greenhouse heating load and amount of piping required, piping arrangements, automatic controls, unit heaters, and operation of the heating system.

1253. Antonjuk, A.
Trials on the use of waste heat from industry in vegetable growing. [Russian.]
Social. seljsk. Hoz., 1954, No. 12, pp. 56-64.

Industrial waste heat, mainly hot water, can be cheaply and effectively used for soil warming both under glass and in the open [see also *H.A.*, 24: 1496]. Experiments in the Moscow region and in the Urals have shown that hot water pipes are a better means of heating both frame and outdoor soils than manure and result in higher and earlier yields at a lower cost. For heating outdoor soils asbesto-cement pipes of 100 mm. diameter are laid 35 cm. deep 80 cm. apart. The water temperature should be about 35–40° C. which ensures soil temperatures of 20–30° C. Under these conditions vegetable seedlings can be raised, indoor grown transplants hardened off or crops grown for consumption. Crops planted in the autumn can be warmed till heavy snow occurs and then again when the protective snow cover melts.

1254. Spoelstra, P. A.
De mogelijkheden van warme-luchtkachels in de tuinbouw. (**The potentialities of hot-air stoves in horticulture.**) [English summary 7 lines.]
Meded. Dir. Tuinb., 1954, **17**: 889-96, illus.

A short survey is given of methods of warm-air heating. Such heating is most successful in bulb and onion stores, mushroom houses and drying sheds; in glasshouses its efficiency is lessened by poor insulation. Methods of using hot-air systems most advantageously are described. The economics of using hot-air systems in glasshouses are compared with other heating systems, and it is concluded that hot-air heating is worthwhile if no more than 750 sq. m. are to be heated by one stove, when a temperature difference of only about 10° C. is required, and when excessive stoking is not involved.

1255. Morris, L. G., and Winspear, K. W.
The effect of solar radiation on measurements of glasshouse air temperature.
Tech. Mem. N.I.A.E. **102,** 1954, pp. 9, illus.

Some typical thermometers used by growers were compared with an Assman psychrometer under various intensities of solar radiation. They were the mercury in glass type; wood backed, mercury in glass; bi-metal, maximum and minimum dial indicator; bi-metal recording thermograph; and sling psychrometer. All showed positive errors increasing as the solar radiation rose. The conclusion is reached, however, that the metal framed mercury in glass thermometer will give a broad indication of the air temperature, particularly at night or on cloudy days. It should be reasonably sited according to position of crop and heating equipment. It is, moreover, suggested that the glasshouse grower should have one good instrument such as the sling psychrometer, which is accurate when correctly operated and is small, portable and reasonably inexpensive.

1256. Croockewit, J. H.
Het onderzoek en de behandeling van ketelwater. (**The checking and treatment of boiler water.**) [English summary 5 lines.]
Meded. Dir. Tuinb., 1954, **17**: 914-19.

Pre-softening of the water supply with lime and soda, and softening of the boiler water with trisodiumphosphate prevented scale formation.

1257. Businger, J. A.
De invloed van raamstanden op de ventilatie van kassen. (**The influence of the position of ventilator panes on glasshouse ventilation.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1954, **17**: 897-903, illus.

The position of ventilator panes relative to wind direction determines the amount of fresh air blown into glasshouses. Tests showed that the following positions will give ventilation in increasing order: bottom windward panes open, top leeward panes open, both top panes open, top and bottom windward open, the same with top leeward open, top and bottom windward and bottom leeward open.

1258. Seidel, E.
Vereinfachung der Giessarbeiten unter Glas. (**Simplifications in the watering of glasshouses.**)
Dtsch. Gartenb., 1955, **2**: 18-21, illus.

Sprinkler- and sub-irrigation in the glasshouse are discussed, and data are given on the effect of sprinkler irrigation upon plant temperature under a variety of conditions.—Inst. Gemüsebau, Grossbeeren.

1259. Esiev, H. A.
Electrode method of frame heating. [Russian.]
Sad i Ogorod, 1954, No. 9, pp. 20-4, illus.

Current passing between 6–7 cm. wide, 0·5–1·5 cm. thick metal electrodes, buried in the ground 50 cm. apart, provides an even soil temperature in the frames. A.C. current of 50 or 100 v. is best for soil warming, but for thawing the ground and soil sterilization higher voltages are needed.

1260. Brown, P. H., and Smith, F. G.
Dutch lights.
Grower, 1954, **42**: 471-3, 519-21, 571, 618-19, 677-9, 721-3, 775-7, 821-2, 878-9, 943, 997-1000, 1038-9, 1095, 1155-7, and 1955, **43**: 26-7, 83-5, 141-2, 188-9, 235-6, 487-9, illus.

The authors discuss Dutch lights cultivation under the following headings: 1. Main object is economy in production; 2. Equipment for frames and structures; 3. One light to cover 4 crops in succession; 4. Rotating roof light in structures; 5. Combined system of frames and structures; 6. The advantages of mobile structures; 7. Mobile is moved 3 or 4 times a year; 8. Preparing the soil in the autumn; 9. Production table for frame crops. Carrots, radishes, spinach and marrows; 10. Celery, cauliflower, turnips and dwarf beans; 11. Cucumbers and melons in cold frames; 12. Strawberries, lettuce and parsley; 13. Bulbs and lettuce intercropped; 14. Production table for structures; generous manuring is essential; 15. Lettuce and cauliflowers in structures; 16. Tomatoes and cucumbers in structures; 17. Sweet peas and chrysanthemums in structures; 18. Zinnias and bulb crops in structures; 19. Costs and returns for lights and structures.

1261. Fleschhut, K.
Frühbeetkästen näher betrachtet. (**Considerations on frames for forcing.**)
Dtsch. GartenbW., 1954, **2**: 230-2, illus.

Among the types of frame discussed is one with a concrete framework and pathway. The concrete sections, 2 m. long, are in the form of a trough with one side somewhat higher than the other. These troughs form the pathways. Glass frames are fitted between them, so forming the hotbeds.

1262. Bunt, A. C.
Steam pressure in soil sterilization. II. Glasshouse *in situ* sterilizing.
J. hort. Sci., 1955, **30**: 43-55, bibl. 11, illus.

A study has been made of the effects of high and low steam pressure in the sterilization *in situ* of glasshouse soils. Thermal efficiency depends on the rate of steam injection (lb.) per unit volume of soil and not on the pressure at which the steam is injected. It was found that the maximum rate should not exceed 18 lb. of steam per hour per sq. ft. of soil surface, equivalent to (*a*) 3·1 lb. (weight) per minute, or (*b*) 2 lb. (pressure)/sq. in. per standard Hoddesdon pipe, with the latter spaced at 18 in. The saving from low rate steaming ranged from 1·0 to 3·5 lb. per cu. ft. of soil, the amount depending on the heat requirement of the soil and the contrasts in rates used. The steam flow rates and pressure losses for a 2 in. steam system are given. A method termed "balanced steaming" is described which combines high thermal efficiency with maximum working rate. [Author's summary.]—John Innes hort. Instn, Hertford. [For Part I, see *H.A.*, 24: 2187.]

1263. L[awrence], W. J. C., and B[unt], A. C.
The John Innes high rate soil steriliser.
John Innes Leafl. **13,** 1955, pp. 10, illus., 1s.

This leaflet gives full building and operating instructions for the John Innes high rate sterilizer, designed for the grower who wants sterilized soil in large quantities. It is unique in employing residual heat as part of the sterilizing process. The techniques employed (the use of dry, sifted, loose soil and of rapid heating and rapid cooling) ensure that practically all risk of damage to the soil and to the plant is eliminated.

1264. Perold, R. P.
Apparatus for soil fumigation.
Sci. Bull. Dep. agric. S. Afr. **357**, 1955, pp. 15, bibl. 1, illus.

Five types of vehicle-mounted pump apparatus were tested and their use is described. Gravity apparatus was also tested. The working of the different types of equipment is explained with the help of diagrams.

1265. Huffman, J. W.
New techniques in greenhouse production.
Market Grs' J., 1955, **84** (2): 8-9, illus.

The steam-sterilization of seed box composts commonly leads to the release of toxic concentrations of organic salts. The use of a mixture developed by the University of California overcomes this difficulty. The mixture consists of 7 parts of a light, wind-blown soil low in total salts and in water-holding capacity, 3 parts peat and, in some cases, 2 parts of coarse sand or gravel. To each 1½ cu. ft. of this mixture is added a base fertilizer consisting of 2 oz. hoof and horn or blood meal, 2 oz. single superphosphate, ½ oz. sulphate of potash and 5 oz. calcium carbonate or dolomitic lime. The mixture, which is being adopted by Los Angeles nurserymen, lends itself to mechanization along lines which are described.

1266. Emmert, E. M.
Polyethylene for cheaper and better greenhouse vegetables.
Market Grs' J., 1955, **84** (2): 22-3, illus.

Light-frame glasshouses using polyethylene plastic film in place of glass have proved successful in Kentucky for the commercial production of vegetable and flower crops. Brief notes are provided on construction and advantages. The main disadvantage is that the film deteriorates during the summer, necessitating re-covering in the autumn; even so production costs are lower than with glass. A blueprint for the greenhouse can be obtained from Agric. Engng Dep., Univ. Kentucky, Lexington, for 10 cents.

1267. Schalt, W., and Dodillet, H. J.
Kunststoff-Folien an Stelle von Glas im Gartenbau. **(Horticultural uses of plastic materials in place of glass.)**
Gartenwelt, 1954, **54**: 249-51, illus.

Plastic materials would have many advantages over glass as temporary covers for valuable crops in the spring and autumn. In preliminary trials polyvinylchloride, supronyl and perlon proved promising, but some drawbacks, such as loss of transparency and formation of condensation water under certain conditions, have to be overcome before their use as glass substitutes can be generally recommended.—Tech. Univ. Berlin-Charlottenburg.

1268. Lauenstein, A., and Binting, A.
Vinidur-Pflanzenschutzhauben haben sich in der Praxis durchgesetzt. **(Vinidur plant protection caps in commercial use.)**
Dtsch. Gartenb., 1954, **1**: 350-2, bibl. 3, illus.

The advantages claimed for the use of Vinidur caps for young plants include not only frost protection but also protection from wind and hail, a higher humidity and CO_2 content for the plant and an undisturbed soil surface. The caps are well anchored by a soil covering on their wide rims. Lettuce covered until about 4 weeks before harvest had an average weight of 140 gm., while uncovered plants weighed 101 gm. Protection of cauliflowers in their early growth stages induced an earlier and heavier yield.

Practical devices and materials.

(*See also* 1275b, w, z, 1539-1542, 1630-1632, 1656, 1657, 1677, 1808, 2310.)

1269. The Commercial Grower.
Mech. Hort., Autumn 1954, No. 2, pp. 29-70, illus.

The present issue of this publication contains articles on: warm water treatment of bulbs, development of machines for smallholdings, nursery heating, the flame gun, the aircraft in horticulture, mobile glass, gas storage and refrigeration, orchard aids, maintenance of petrol driven engines, and the mechanization of propagation to save labour. [See also *H.A.*, 24: 3321.]

1270. Weber, R.
Quels avantages offre le Biopot? **(The virtues of the Biopot.)**
Rev. hort. suisse, 1955, **28**: 17-18, illus.

The biopot is made from a strip of galvanized sheet iron shaped to form 2 sides and the bottom of a cube. Each biopot is placed on the bench in the opposite direction to its neighbour, so that the soil in each pot is supported on all 4 sides. There is no check to plants at transplanting and growth may be advanced by 10–20 days.

1271. Leaney, E. J.
Plastic pot labels.
J. Aust. Inst. agric. Sci., 1954, **20**: 251-2.

Sheets of perspex, ⅛ in. thick, were cut up to make clean, durable labels 5×¾ in. at a cost of approximately 4¾d. per label. Pencil-written figures remained clear for over a year in pots, but could easily be removed with a rubber or cloth and sandsoap.

1272. Steinmetz, H.
Warum zick-zackschneidige Hacken? **(Hoes with several wide teeth.)**
Tech. Bauern Gärtner, Ausg. A, 1954, **6**: 399, illus.

Hoes with blades broken up into several wide teeth are reported to have advantages over ordinary hoes for a variety of operations and conditions. Two models of the tool produced by a German firm are illustrated.

1273. Mauch, A.
Porosynth—ein neuer Isolierstoff. **(Porosynth—a new insulation material.)**
Mitt. ObstbVersuchringes Jork, 1954, **9**: 234-5, illus.

Blocks of the new synthetic material made from polystryol are particularly suitable for the erection of cold storage holdings. Advantages and certain drawbacks are discussed.

1274. Schwanitz, F.
"Tylose" und "Aerosil" als Hilfsmittel bei der Colchicinbehandlung. **(Tylose and Aerosil as aids in colchicine treatment.)**
Züchter, 1955, **25**: 60, bibl. 1.

Since recommending tragacanth gum as a carrier for colchicine (*H.A.*, 20: 35) the author found that under certain conditions this substance is liable to liquefaction by bacteria. Two proprietary chemicals, Tylose (methyl cellulose plus carbocylmethyl cellulose) and especially Aerosil (a silica gel), were found to be much more suitable than tragacanth gum.—Inst. f. Bastfaserforsch., Niedermarsberg/Westfalen.

Noted.

1275.

a Andersson, N. E., Hertz, C. H., and Rufelt, H.
A new fast recording hygrometer for plant transpiration measurements.
Physiol. Plant., 1954, **7**: 753-67, bibl. 26, illus.
Dep. Physics, Univ. Lund, Sweden.

b Baldacci, E., and Fogliani, G.
La valutazione del materiale biologico e abiologico dell'atmosfera. I. Descrizione di un apparecchio per la captazione delle spore, polline, ecc. II. Caratteristiche d'impiego in campo e in centri urbani. **(Evaluation of biological and non-biological material in the atmosphere. I. Description of an apparatus for the collection of spores, pollen, etc. II. Uses in the field and in urban centres.)**
Reprinted from *Boll. Soc. ital. Biol. sper.*, 1953, Vol. **19**, pp. 2, illus., pp. 2, bibl. 3, as *Pubbl. Ist. Pat. veg. Milan* **51.**

c Bukin, V. N., and Erofeeva, N. N.
Comparative P-vitamin activity of tea catechins, vine tannins and buckwheat rutin. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **98**: 1011-12, bibl. 5.
Tea catechins > rutin > vine tannins.

d Coppenet, M., and others.
Microdosage colorimétrique du cuivre dans les végétaux par la 2-2′ diquinoléine. **(Colorimetric microdetermination of copper in plants by 2-2′ diquinoline.)**
Ann. agron., 1954, **5**: 597-600, bibl. 8.

e Gerretsen, F. C.
Some aspects of the microbiological determination of magnesium, zinc, copper and boron.
Trans. int. Soc. Soil Sci., Jt Mtg Commiss. II and IV, 1952, **1**: 151-66, bibl. 12.
Generally *Aspergillus niger*, but also for boron, *Azotobacter chroococcum.*

f Graeber, R. E.
Die Verpackung, Kennzeichnung und Plombierung nach dem Saatgutgesetz. **(Packing, labelling and sealing in accordance with recent West German government seed regulations.)**
Saatg.-Wirtsch., 1955, **7** (1): 4-6.

g Hudgins, H. N., Smith, C. K., and Schmidt, C. M.
Bibliography of literature on potash as a plant nutrient. Reviewed July 1942 through December 1942.
[*Publ.*] *Amer. Potash Inst.* K-XI-XII, 1954, pp. 135.
See also *H.A.*, 19: 819, 23: 1488, 2486, 3771p.

h Hupkes, J. H.
Toepassing van ventilatoren. **(The use of fans.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1954, **17**: 904-11, illus.
Considerations of a practical nature.

i Masi, M.
L'esportazione ortoflorofrutticola italiana. **(Italian fruit and vegetable exports.)**
Ital. agric., 1954, **91**: 559-84.

j Meidner, H.
Measurements of water intake from the atmosphere by leaves.
New Phytol., 1954, **53**: 423-6, bibl. 5.
Technique and results described for xerophyte, *Chaetacme aristata.*

k Pienaar, W. J.
The spectrograph in the service of agriculture.
Dec. Fruit Gr, 1954, **4**: 223-5, illus.
For leaf analysis.—W.P. Fruit Res. Stat., Stellenbosch.

l Piquer, G.
Les plantes et les facteurs du climat. **(Plants and climate.)**
Bull. hort. Liège, 1954, **9**: 3-7, 35-8, 67-72, 99-102, 131-5, 163-7, 195-200, 227-34, 247-52, 279-83, 296, 311-16, bibl. 18, illus.

m Powell, A. A., and Baumgart, M. G.
Low voltage electric soil warming.
N.Z. J. Agric., 1954, **89**: 477-80, illus.

n Reichenberg, D., and Sutcliffe, J. F.
Absorption of ions by plants.
Nature, 1954, **174**: 1047-8, bibl. 18.
In water culture.—Chem. Res. Lab., Teddington.

o Rietsema, C.
De tuinbouw in Spanje en Frans Marokko. **(Horticulture in Spain and French Morocco.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1954, **17**: 863-83, illus.

p Robinson, R. W.
Seed germination problems in the Umbelliferae.
Bot. Rev., 1954, **20**: 531-50, bibl. 113.

q Rosewarne. (N.A.A.S.)
Station Guide Rosewarne Experimental Horticulture Station 1954/5, Camborne, Cornwall, pp. 45.
Continuation of trials briefly noted *H.A.*, 24: 1065.

r Ruge, U.
Anwendungsmöglichkeiten der Wuchsstoffe im Gartenbau. (**The possibilities of using growth substances in horticulture.**)
Angew. Bot., 1954, **28**: 114-20, bibl. 14.

s Scheltinga, H.
Zink in grond, plant en dier. (**Zinc in soils, plants and animals.**) [English summary ½ p.]
Landbouwk. Tijdschr., 1954, **66**: 836-45, bibl. 29.
A literature survey.

t Shipway, G. P.
Engineering developments in the glasshouse industry.
Agriculture, Lond., 1955, **61**: 520-3.
Heating, lighting, sterilization and trickle irrigation.

u Sholto Douglas, J. W. E. H.
The Bengal system of soilless culture.
Comm. Gr, 1954, No. 3079, pp. 1303-4, illus.
Soilless cultivation in India.
Gdnrs' Chron., 1954, **136**: 86-8, 116, 117, 164, 165.
The soilless cultivation of vegetables in India.
World Crops, 1955, **7**: 56-60, bibl. 9, illus.

v Školjnik, R. Ja.
Quantitative separation of organic acids in plants by partition chromatography on silica gel. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **98**: 443-6, bibl. 5.

w Spurr, A. R.
Orienting minute objects for sectioning in a definite plane.
Stain Tech., 1955, **30**: 13-14, bibl. 9.

x Tihomirov, B. A., and Strelkova, O. S.
Mycorrhiza of plants in the Arctic zone. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **97**: 337-9, bibl. 10.
Of 92 plant species examined only 27 showed mycorrhiza.

y Whittingham, C. P.
Energy transformation in photosynthesis and the relation of photosynthesis to respiration.
Biol. Rev., 1955, **30**: 40-64, bibl. 74.

z Wrigley, H. M.
The use of aircraft in agriculture.
J. Aust. Inst. agric. Sci., 1954, **20**: 214-20.
Experience and prospects discussed.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 1182, 1190, 1191, 1275i, 1373a, b, c, d, f, 2268, 2272, 2287, 2288, 2294, 2304.)

1276. Purdie, A.
Hawke's Bay Fruit Research Station.
Fruit and Prod., 1954, November, pp. 12-14.

A general picture of the 24-acre research sub-station is given. Trials with pome and stone fruits cover 12 acres, half of which is planted with rootstock trials. It comes under the direction of the main D.S.I.R. Research Station at Auckland.

1277. Lenander, S.-E.
Försök med frukttråd vid Rånna under åren 1938-1952. (**Fruit tree trials at Rånna 1938-52.**) [Summaries in English (pp. 2¼) and Esperanto.]
Medd. Trädgårdsförs. Malmö **89**, 1954, pp. 32, bibl. 12, illus.

Three trials were carried out at Rånna Experiment Station on the slopes of a mountain in Västergötland, Sweden, to study (1) varietal reactions of apples to A3 and five East Malling rootstocks; (2) varietal reactions of apples to four pruning treatments; (3) varietal reactions of apples, pears, cherries and plums to three methods of soil management. The experimental records are tabulated and the results are discussed.

1278. Leslie, W. R.
The prairie home orchard.
Publ. Canada Dep. Agric. **901**, 1954, pp. 67, illus., 25 cts.

Although the author points out that the bulletin is general in nature and that more inquisitive readers should refer to standard books and more specialized bulletins, this publication is undoubtedly specialized itself as regards the prairie conditions for which it caters, namely those obtaining in the parts of Manitoba where orcharding is possible. It should be useful, not only to those who live on the northern Great Plains, to whom primarily it is addressed, but also to home makers in other parts of the world endowed with similar continental climatic conditions of intense cold in winter, high winds and sudden temperature changes. The first and foremost necessity is wind protection and this is dealt with in a practical and comprehensive manner, so that the reader will know how best to obviate the disadvantages of prolonged low temperature and inadequate water supply. Thereafter all problems of cultivation under such conditions are considered. The reader is assumed to have some elementary knowledge and the actual details of most technical operations are not given.

A most valuable section concerns the particular varieties and crosses which are likely to prove successful. Among apples only the crab, *Malus baccata*, and crosses between it and *Malus pumila* have proved successful, some for jelly making and canning, while two of the crosses, viz. Trail and Rescue, are cited as giving good dessert fruit. European pears are unsuitable. Manchurian pears give hard gritty fruit suitable for jelly making, but some improvement has been achieved in them by work at Ottawa, in Minnesota, S. Dakota and at Morden.

Among plums much improvement has been made in the native species by selection and crossing. Others, from among which useful varieties are named, are hybrids of American and Japanese plums, Canada × Japanese plums, American×the apricot plum (*P. simoni*), Japanese plums (*P. salicina*), and "cherry plums" which are hybrids of sand cherry (*P. besseyi*) and larger plums. The European plum, *P. domestica*, is not suitable. Of cherries the sweet cherries are not hardy enough, but others found useful include sour cherries of the Amarelle and especially the Morello group, the Mongolian cherry (*P. fruticosa*) and the Nanking or Manchu cherry (*P. tomentosa*). The Korean cherry, *P. japonica*, has been improved but is not so successful as the Nanking. Apricots suffer from their early blossoming habit and the inclination of the flower buds to develop in warm spells during wintry weather. Peaches fail. An interesting, well annotated list is given of promising native fruits. Among nuts black walnuts, butter nuts (*Juglans cinerea*) and native filberts grow in some localities.

1279. Morettini, A.
Principali aspetti della coltivazione dei fruttiferi adatti alla produzione della frutta secca e da essiccare. (**Principles of the culture of [nut trees and] trees producing fruits suitable for drying.**) [English and French summaries 7 and 8 lines.]
Riv. Ortoflorofruttic. ital., 1954, **37**: 385-403, illus.

The fruits in question are almonds, walnuts, hazel nuts, figs, carobs, pistachios, apricots, peaches, cherries, apples, pears, raisins and prunes. Statistics are given of Italian production, exports and imports.

1280. Pasquier, J.
Situation des cultures arbustives irriguées et en culture sèche en vue de l'orientation à donner aux plantations nouvelles. (**The situation [in Tunisia] regarding fruit tree crops in dry and irrigated culture and recommendations on future plantings.**)
Tunis. agric., 1954, **55**: 117-33.

Production: the fruit-growing regions of Tunisia; the relative importance of the various crops; traditional and modern cultural methods; planting; manuring; pest, disease and fruit drop control; choice of varieties of citrus, apricot, peach, almond, apple, pear, plum, fig, pomegranate and quince. *Markets:* for citrus, apricot, almond, peach and pome fruits.

1281. Ali, A.
Fruit growing in Afghanistan.
Punjab Fruit J., 1953, **17**: 20-3.

A brief review of environment and localization, the following fruits being cited: apples, pears, apricots, plums, cherries, grapes, figs, mulberries, nuts, pomegranates, citrus and dates.

1282. Neubauer, H. F.
Bemerkungen über das Vorkommen wilder Obstsorten in Nuristan. (**Observations on the occurrence of wild fruit species in Nuristan.**)
Angew. Bot., 1954, **28**: 81-8, bibl. 9.

The fruits grown in Nuristan (East Afghanistan) are described and their possible origin discussed. Fruit species are grown in gardens or in fields near the houses; those mentioned are vine, apricot, almond, walnut, sour cherry, pomegranate, mulberry, persimmon, *Zizyphus vulgaris*, and *Elaeagnus* sp. No apples, peaches or sweet cherries are grown, indicating that these fruits have never been introduced. It is unlikely that the other fruits have been introduced, and the author concludes that most of those grown originated from indigenous wild species which have been domesticated.

1283. Ahmad, S.
Cultivation of loquat (*Eriobotrya japonica*) in the Punjab.
Punjab Fruit J., 1954, **18** (66/67): 21-2.

Environmental requirements, propagation, cultural practices and varieties. Its normal method of propagation is by budding or inarching on seedling loquats.

Breeding and varieties.

(*See also* 1183, 1373k, m, n, o, 2277.)

1284. Brooks, R. M., and Olmo, H. P.
1954's new fruit varieties.
Amer. Fruit Gr, 1955, **75** (1): 30-1, 43-52, illus.

Some varieties introduced in 1954 are briefly described, viz. 4 apples, 2 avocados, 1 blackberry, 1 blueberry, 2 cherries, 5 grapes, 6 nectarines, 15 peaches, 5 pears, 1 pecan, 5 plums, 1 raspberry, 6 strawberries, and 3 walnuts.

1285. (Dullum, N., and Rasmussen, P. M.)
Frugtsortsundersøgelsen 1951-53. (**Fruit variety studies 1951-53.**)
Erhvervsfrugtavl., 1954, **20**: 299-307, illus.

The article is a version of the report on fruit variety studies published by the Committee of Fruit Cultural Economy for 1951-53. The conclusions drawn from three trials at Blangstedgaard are discussed under 4 headings: I. Varieties recommended for planting; II. varieties recommended for further trial; III. varieties not recommended for planting; IV. remarks on Danish apple varieties.

1286. Balsgård (Granhall, I.).
Föreningen för Vaxtförädling av Fruktträd. Verksamhetsåret 1953. (**Annual Report of the Society for Fruit Tree Breeding, Balsgård, for 1953**), pp. 22.

Very brief notes on new crosses, selection of old crosses, testing for cold resistance, fruit storage and the induction of mutations by X-rays and radio-isotopes.

1287. Miller, E. V.
The natural origins of some popular varieties of fruit.
Econ. Bot., 1954, **8**: 337-48, bibl. 23.

Interesting notes are given on the origins and discovery of many fruit varieties which have arisen as chance seedlings or natural mutants, and on the introduction of others which are of unknown origin. Those mentioned include such well-known varieties as the Concord grape, Elberta and Belle of Georgia peaches, Rhode Island Greening and York Imperial apples, Washington Navel and Temple oranges, Marsh Seedless and Ruby grapefruits, Gros Michel banana, and many others.

1288. Kemmer, E., and Thiele, I.
Frostresistenzprüfungen an keimenden Kernobstsamen. (**Testing the frost resistance of germinating pome fruit seed.**)
Züchter, 1955, **25**: 57-60, illus.

Large numbers of germinating apple and pear seeds with emerging radicles were exposed to 5 temperatures ranging from −1·5 to −5·5° C. for a period of 3 hours, with the object of simplifying the screening of breeding material for frost resistance. The evaluation of the results was complicated by the decrease in frost resistance with an increase in the length of the radicle, but it was possible to separate the wholly resistant from the only partially resistant material. Partial resistance was characterized by the death of the radicle following cold treatment and the formation of adventitious roots. As was to be expected varieties known to be hardy, many of them of Russian origin, yielded the highest percentage of resistant progeny. However, the hardiness of the progeny of Antonovka and Graham, the latter Germany's most important source of seed for apple rootstocks, was found to be inadequate. The frost resistance of perry pears was equal to that of apples and superior to that of dessert pears.—Tech. Univ. Berlin-Charlottenburg.

1289. Wilner, J.
Results of laboratory tests for winter hardiness of woody plants.
Rep. Proc. 10th annu. Mtg west. Canad. Soc. Hort. 1954, Saskatoon, Sask., pp. 115-17, bibl. 2.

Electrical conductivity readings in micromhos are tabulated for twigs of 18 varieties of apple, apple-crab and crab apple collected on 25 January, 1 February and 12 February at the Experimental Farm, Indian Head, Sask. Highly significant correlations existed between the readings on the 3 dates. Twigs of the same varieties collected on 25 January were subjected to slow and rapid artificial freezing from 25° to −50° F. Highly significant correlations were found between the average electrical conductivity readings following the freezing treatments and the average readings of the twigs collected on the 3 dates after outdoor exposure only, and also between the average readings for the 2 freezing treatments. It is concluded from the results of this preliminary investigation that electrical conductivity provides a consistent measure of freezing injury, and that with further refinements it should provide the means of measuring fairly accurately the relative hardiness of closely related plants such as *Malus* spp.

1290. Anon.
New apple variety.
Amer. Nurserym., 1954, **100** (9): 81.

Jerseyred, a new apple produced by the New Jersey Agricultural Experiment Station, has given good results in extensive field tests. It is excellent both for eating and cooking and keeps well in storage. It ripens later than Rome and hangs on the tree better.

1291. Kobel, F., and Schaer, E.
Der Schweizer Orangenapfel. **(The apple variety Schweizer Orangenapfel.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 61-4, 1 colour plate.

The new apple variety Schweizer Orangenapfel, released in December, 1954, after extensive testing, was selected from a Wädenswil cross between Ontario and Cox's Orange. History and characteristics of the variety are discussed in some detail, uniformity of high quality being an important merit. A separate colour plate, with a pomological description on the reverse, is attached for insertion in Kessler's work *Apfelsorten der Schweiz.*

1292. Shewfelt, A. L., and Unrau, P.
The yield and quality of jelly from fifteen varieties of crabapples.
Rep. Proc. 10th annu. Mtg west. Canad. Soc. Hort. 1954, Saskatoon, Sask., pp. 37-8.

In 1953 7 varieties gave jelly yields in excess of 700 g. per 1,000 g. of fruit; yields of the others ranged from 650 g. down to 297 g. Comparisons between 4 different harvesting dates showed significant differences in jelly yield and flavour but not in colour. Freezing the fruit prior to extraction gave consistently higher yields of jelly, especially with certain varieties, but slightly lower ratings for colour and flavour. On the basis of yield and quality the two best varieties were Dolgo and Bedford.—Exp. Stat., Morden, Man.

1293. Brock, R. D.
Hormone-induced pear-apple hybrids.
Heredity, 1954, **8**: 421-9, bibl. 17.

Hybridization and parthenocarpy were produced by applying β-naphthoxyacetic acid to the base of the style of the pear at the same time as the apple pollen was applied to the stigma. The hormone stimulated the growth of the apple pollen tubes and thus allowed fertilization to occur, but this was later than pear-pear fertilization. The success of the cross also depends on the effect of the hormone in inducing parthenocarpy and preventing the loss of the late developing hybrids. The growth of the pear-apple seedlings was abnormal but 4 months after germination 37% still survived. The seedlings were otherwise intermediate in character between pears and apples. [Author's summary.]—John Innes hort. Instn.

1294. Williams, A. H.
Phenolic substances of pear-apple hybrids.
Nature, 1955, **175**: 213, bibl. 3.

The leaves of apple-pear hybrids contained the phenolic substances typical of, and in some cases specific to, the two parent species. In two triploid hybrids (diploid pear × tetraploid apple) the pear phenolics were relatively weaker than in those hybrids of which both parents were either diploid or tetraploid.—Long Ashton Res. Stat.

1295. Dabbs, D. H.
A survey on the availability and hardiness of *Prunus* spp. being grown at prairie horticultural institutions.
Rep. Proc. 10th annu. Mtg west. Canad. Soc. Hort. 1954, Saskatoon, Sask., pp. 95-108.

Data on winter hardiness obtained from replies to a questionnaire are tabulated for a large number of varieties representing several *Prunus* species and hybrids.

1296. Paločaĭ, R.
A peach hybrid, resistant to aphid. [Russian.]
Priroda, 1954, **43** (12): 74-8, illus.

In Rumania a young peach tree, variety J. H. Hale on *Prunus amygdalus* var. *amara*, was decapitated at the height of 1 m. and budded with the rootstock species as mentor. The variety thus became an intermediate stem piece furnished with branches. Pollen from the variety Red Elberta, treated in the same manner, was used for cross-pollinating emasculated flowers of the J. H. Hale. The cross resulted in the production of 3 hybrid seedlings, all showing some resistance to *Myzodes persicae* and producing large, good quality fruits. One of the hybrids, No. 1127, was particularly resistant to the aphid and is now being propagated on various rootstocks and in various parts of the country for further testing.

1297. Evreinoff, V.-A.
Les ancêtres de nos abricotiers. (**Ancestors of our apricots.**)
Arboric. fruit., 1955, No. 12, pp. 2-4, 7, bibl. 8.

The natural habitat of *Armeniaca vulgaris*, from which most cultivated varieties of apricot have originated, is in the mountainous regions of north-east China, stretching to central Asia. In these areas there is no sudden temperature change during the winter, and spring comes later than on the plains, so that flowering takes place when there is little risk of frost. It has been observed in the North Caucasus that altitude affects the regularity of the yield of apricots, those at 350–500 m. giving the greatest number of good crops.

1298. Ullah, H.
Sweet cherries—varieties and their future scope in the Punjab.
Punjab Fruit J., 1953, **17** (62/63): 29-31, bibl. 3.

Analyses were made of the fruits of 6 cherry varieties, Early Rivers, Frogmore, Black Cir[c]assian, Knights Early Black, Napoleon and White Heart, and their physical and chemical properties are listed. It is suggested that they could be grown in the Murree Hills.

Propagation and rootstocks.

(*See also* 1991, 2305.)

1299. Barg, T.
Über zytologische Untersuchungen von Stammbildner- und Saatgutspendersorten des Kernobstes. (**Cytological research on pome fruit varieties of stem-builders and seedling rootstock parents.**)
Gartenbauwiss., 1954, **1** (n.s.): 273-6, bibl. 2.

Buds of 29 apple and 9 pear varieties were collected and their chromosomes counted. Pollen of diploid varieties was generally found to be even in size and shape, that of triploid varieties misshapen and of variable size. There was great variation in percentage germination between varieties, but there was no correlation between percentage germination and ploidy.

1300. Bolotskiĭ, Ju. S.
Stratification of seed on ice. [Russian.]
Sad i Ogorod, 1954, No. 12, pp. 41-3.

Apple seeds of 25 varieties, in muslin bags, were soaked in frequently changed cold water for 4 days, and were then placed on crushed ice in a bucket with an opening in the bottom for flow of thawing ice, and covered with more ice. The bucket was kept at 2° C. and the thawing ice was gradually replaced. About 65 days from the start of the treatment (including soaking) many sprouting seeds were found in the bags. When the treatment was repeated with different species and varieties of apple and wild pear and compared with the accepted method of stratification (in sand at 3–7° C. for a prescribed period), it was found that seed stratified for 60–65 days on ice gave about 90% germination compared with slightly over 50% in sand. The method was also very effective with some species of cherry and apricot, and dwarf almond [*Amygdalus nana*].

1301. Lihonos, F. D.
Accelerated raising of fruit tree rootstocks. [Russian.]
Sad i Ogorod, 1954, No. 12, pp. 37-8, illus.

In the Leningrad region stratified seed of cultivated apple and plum, wild apple, cherry plum and sour cherry was sown in the greenhouse on 1 March. The seedlings were pricked out into nutrient blocks, placed in frames from 15 April to 15 May and planted out in early June. They grew very well and most of them were budded in August. At all stages seedlings were attacked by *Rhizoctonia*, which was controlled by watering with 0·5–1% bordeaux solution. In later work, to prevent the development of this disease, the compost used in the nutrient blocks was disinfected with formalin.

1302. Gavrilov, V. G., and Fedorov, B. I.
Local application of peat-compost mixture and phosphorobacterin in the seedling nursery. [Russian.]
Agrobiologija, 1954, No. 5, pp. 105-9, illus.

In the north-western area of the Soviet Union with a short growing season, an early vigorous growth is necessary for the satisfactory production of wild seedling rootstocks. In a well-manured clay loam the effect of 6 nutritional treatments was studied on wild apple seedlings. Treatment with compost mixture consisting of 3 parts peat, 2 parts compost and 1 part soil, applied in the row before sowing at the rate of 18–20 tons per ha, increased the production of first class standard rootstocks 7-fold compared with the control. A similar application plus phosphorobacterin treatment of seed still further increased yields.

1303. Nesterov, Ja. S.
Variability of clones of apple seedlings. [Russian.]
Agrobiologija, 1954, No. 5, pp. 140-2, bibl. 1, illus.

It is shown that vegetatively propagated progeny of phasically young seedlings change under the influence of growing conditions. When apple hybrid seedlings were layered they developed into plants which differed in growth characteristics from the original seedlings and from each other. Scions taken from these layers continued to show the same growth characteristics.

1304. Baumgart, M. G.
Seedling rootstocks for apples in Papanui district.
N.Z. J. Agric., 1954, **89**: 281-4, illus.

Many soils in the Papanui district of New Zealand are too wet for trees on Northern Spy to remain vigorous over a number of years. Malling XII has recently become available, but until its behaviour under local conditions is known most growers prefer to use seedling rootstocks. The most commonly used seedling stocks are those from Lord Wolseley and Sturmer Pippin. In practice seedling variation does not seem to be a serious drawback. The methods of raising the stocks and their propagation are described.

1305. Karnatz, H.
Über den Einfluss der Aufschulstärke der Unterlage auf die Entwicklung des Edlings. **(The effect of rootstock diameter on scion growth.)**
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 353-5, bibl. 1.

With apples and pears rootstock diameter (6–7, 7–8 and 9–12 mm.) had no influence on the growth of the scion in the first year after working. With pears, though not with apples, rootstocks raised from seed without transplanting gave slightly better results than seedlings that had been pricked out. These nursery trials were carried out on a fairly large scale with single varieties of apples and pears and of apple and pear seedlings.

1306. Kemmer, E.
Eine neue Methode der autovegetativen Vermehrung von Apfelsorten. **(A new method of propagating apple varieties on their own roots.)**
Dtsch. Baumsch., 1955, **7**: 15-18, illus.

In his search for methods of propagating apple varieties on their own roots, the author improved on the so-called "nurse-root" method [*H.A.*, 23: 1533] by, as it were, reversing it. Instead of grafting the scion onto the rootstock, pieces of root (10 cm. long, 3–4 mm. thick) were grafted in April onto 1-year-old shoots of stooled plants. In October, 1954, 6 months after grafting, 190 m² of stool bed (52 apple varieties) yielded 795 1½-year-old shoots, on 95% of which the union was achieved and the root piece had made good growth. About one-half of these shoots had begun to develop their own roots.—Inst. für Obstbau, Berlin-Dahlem.

1307. Way, D. W.
The relationship of diameter to regenerative organ differentiation in apple roots.
Proc. kon. ned. Akad. Wetensch., Ser. C, 1954, **57**: 601-5, bibl. 2.

The relationship of root diameter to shoot, shoot primordia and root production was studied in M.IX and Crab C. A positive correlation was found to exist between shoot production and diameter, while the correlation between root production and diameter was partially negative. The distribution of shoot primordia and the percentage of those which developed into shoots appeared to be positively correlated with diameter.

1308. Bovay, E.
Essais de fumures et de porte-greffes sur Reine des Reinettes. Examen de l'alimentation par le diagnostic foliaire. **(Manurial and rootstock trials with Reine des Reinettes. Nutritional examination by leaf analysis.)** [German, Italian and English summaries.]
Landw. Jb. Schweiz, 1954, 3 (n.s.): 1029-39, bibl. 18.

An orchard of Reine des Reinettes grown as standard trees on M.XII and XIII, with intermediate stems of Niederlenz, Croncels and J. Lebel, was planted in 1938 on a neutral soil, poor in P_2O_5 and K. A complete fertilizer and one without P_2O_5 were applied from 1943. The best growth and yields were from those trees on M.XII, with intermediates of Niederlenz or Croncels, which had received complete fertilizer. Leaf analysis was used to determine the effects of rootstock, intermediate stock and fertilizer on mineral absorption by the trees. The presence of P_2O_5 in the fertilizer reduced K uptake, but there was an increase in P_2O_5 and especially N uptake. M.XII showed greater K but less N, P and Ca uptake than M.XIII. Of the 3 intermediate stocks, Niederlenz showed the greatest nutrient absorption and Lebel the weakest. On M.XII Niederlenz absorbed much K, but its K uptake was feeble on M.XIII. Lebel on M.XIII showed weak nutrient absorption, especially of N.—Lausanne.

1309. Preston, A. P.
Apple rootstock studies: Malling-Merton rootstocks.
J. hort. Sci., 1955, **30**: 25-33, bibl. 14.

Results obtained in the first 7 years of field trials with 16 new clonal apple rootstocks are presented. The stocks include the 15 woolly aphid-resistant stocks of the Malling-Merton series (MM. 101-115), and a promising new rootstock, not highly resistant to woolly aphid, known as Malling XXV. [See also *H.A.*, 23: 162, 2552-2554.]—E. Malling Res. Stat.

1310. Scheys, G.
Sur quels sols les plantations sur type IX sont-elles à conseiller? **(On which soils should orchards on type IX be planted?)**
Fruit belge, 1954, **22**: 161-5.

Soils which are considered best for orchards on M.IX rootstocks are silts, sands and sandy-silts, provided that they have a relatively high water table. Uneroded silts and colluvial soils are best among the silt group; deep sandy-silts and colluvial sandy-silts are the best of their group. The ideal sandy soil is one black, rich in humus, and containing a certain amount of clay.

1311. Budagovskiĭ, V. I.
Winter hardiness of the root system of dwarfing and semi-dwarfing apple rootstocks. [Russian.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1954, No. 6, pp. 11-25, bibl. 33.

Frost resistance studies were conducted under both controlled and natural conditions at Mičurinsk on the popular clonal dwarfing rootstocks "Paradise VIII and IX" and semi-dwarfing "Doucin II, III, IV and V".* For control, the widely distributed seedling rootstocks *Malus silvestris*, *M. prunifolia* and *M. pallasiana* were used. No great variation was found in the hardiness of the experimental material. Temperatures of −10 and −11° C. caused substantial damage and at −12° C. the majority of the rootstocks were killed. Doucin III showed the greatest resistance. In early spring even −8° C. resulted in serious injury. Frost resistant varieties improved the hardiness of the rootstocks. From these results it appears that dwarf apples are unsuitable for commercial cultivation in the central regions of the U.S.S.R., though trees on Doucin III and Paradise IX might be grown in favourably situated gardens. The new rootstocks, dwarfing 9 and semi-dwarfing 13-14 [raised in U.S.S.R.], also included in these trials, showed better frost resistance than the established ones.

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* Apparently the E.M. series.

1312. THIEL, K.
Untersuchungen zur Frage der Unverträglichkeit bei Birnenedelsorten auf Quitte A (Cydonia EM A). **(Research on the problem of incompatibility of pear varieties with quince A.)**
Gartenbauwiss., 1954, **1** (n.s.): 127-59, bibl. 40, illus.

The histology and physiology of young budded trees of Gellerts Butterbirne, Gräfin von Paris, Jules Guyot, and Marguérite Marillat on quince A were studied. Preliminary cell growth in both incompatible and compatible unions was similar. Differences were shown between different compatible unions in the extent of reabsorption of primary, and formation of secondary, non-lignified tissue between stock and scion. The ability to reabsorb the primary non-lignified tissue was found predominantly in young meristematic tissue, and became greater with increasing compatibility. The function of an intermediate shield in double shield-budding appeared to be to strengthen the absorptive power of both stock and bud. In incompatible unions a brown-coloured, secondary non-lignified tissue arose through the death of existing cambial marginal cells; its formation could apparently be inhibited by the insertion of a graft intermediate. The primary and secondary non-lignified tissue together formed a definite brown dividing line between stock and scion preventing satisfactory union. The brown coloration of the tissue may be due to oxidation products.—Inst. Obstb., Bonn.

1313. COOMBE, J.
The propagation of stone fruit trees.
N.Z. J. Agric., 1954, **89**: 399-411, bibl. 1, illus.

Peaches in New Zealand are generally worked on seedling peach stocks, such as Golden Queen or Lady Palmerston. Myrobalan is the most suitable stock for plums, though marianna is preferred for vigorous-growing Japanese varieties. Apricots are grown on myrobalan, apricot or peach seedlings, plum being the most suitable general stock. For cherries the mazzard is considered the best stock, but mahaleb is also used.

1314. LALATTA, F.
Trattamenti fotoperiodici e sviluppo delle piantine da seme. **(Photoperiodic treatment and the development of seedlings.)** [English summary 5 lines.]
Ann. Sper. agrar., 1955, **9**: 221-4, bibl. 1, illus.

Exposure to 6-hour photoperiods for 10 days from germination had no significant effect on the growth of peach seedlings during the first year of their life.

1315. PLOCK, H.
Einiges über die Unterlagenfrage bei Marillen. **(Remarks on rootstocks for apricots.)** [English, French and Spanish summaries 3 lines each.]
Mitt. Klosterneuburg, Ser. B, 1954, **4**: 152-5.

The following rootstocks are discussed: St. Julien Seedling, Myrobalan Seedling, Greengage, Ackermann, Marianna, Yellow Kroosjespruim, Brussels, Brompton, apricot seedling, root suckers of zwetsche, the so-called Kriechen plum and bitter almond.

1316. PASSECKER, F.
Keimversuche an Zwetschken- und Marillenkernen. **(Germination tests with zwetschen and apricot.)** [English, French and Spanish summaries 6 lines each.]
Mitt. Klosterneuberg, Ser. B, 1954, **4**: 249-54, bibl. 4.

The percentage germination of shelled and peeled zwetschen embryos was 10% after 3 weeks. Unpeeled embryos did not germinate even after 5 months. The beginning of January or February was the best time for starting germination tests with zwetschen. Peeled seeds of zwetschen soaked in 5% ceresan for 2 hours gave 60% germination in 3 weeks, compared with 10% for unsoaked seeds. Tests on storage at various temperatures and humidities showed that zwetschen germinated best and most rapidly after warm stratification; apricot germinated best after dry storage.

1317. TRUSEVIČ, G. V.
Rootstock for the sour cherry variety Ljubskaja in the Kuban. [Russian.]
Sad i Ogorod, 1954, No. 9, pp. 54-6, illus.

Observations since planting in 1941 showed that the scion variety produced better trees and higher total yields on wild cherry than on mahaleb or on its own seedling rootstocks.

1318. RAO, H. S. V.
Graft mulberry.
Reprinted from *Industr. Mag.*, 1953, **1** (3): 7-12 in *Mysore agric. J.*, 1954, **30**: 36-9, illus.

The Japanese mulberry variety, Kaeryo Nezumi Gaeshi, rootgrafted on the common Mysore bush mulberry raised from seed or cuttings gives a 30% higher yield of more nutritious, larger, thicker (and therefore more easily stored) leaves than the common Mysore variety.

Growth phenomena.

(*See also* 1213, 1214.)

1319. EVANS, W. D.
Water losses in woody twigs as associated with periderm thickness.
Rep. Proc. 10th annu. Mtg west. Canad. Soc. Hort. 1954, Saskatoon, Sask., p. 114.

Twigs of 6 apple and 2 crab-apple varieties with their cut ends waxed were dried for 96 hours at 80–90° F. A highly significant positive correlation was found between water loss per g. fresh weight and periderm thickness per cm. However, one of the most winter hardy varieties, Heyer 12, had a thicker periderm and lost more water than the tenderest variety, George. This does not support the view that desiccation is an important factor in winter injury, but it is considered possible that, if total moisture content of the twigs had been recorded, it might have been shown that the tenderer varieties had lost most of their water before the experiment began. This possibility is being investigated.

1320. ACKLEY, W. B.
Seasonal and diurnal changes in the water contents and water deficits of Bartlett pear leaves.
Plant Physiol., 1954, **29**: 445-8, bibl. 14.

There was a general reduction in leaf water content in

Bartlett pear leaves during the growing season, which was due to an increase in dry matter content and not to a decrease in water content. Maximum water deficits occurred around 2 p.m. each day, and minimum deficits about 2 a.m. The differences in diurnal extremes were greater early in the growing season. Water deficit changes in leaves could be related to environmental conditions only after the leaves had reached full size.

1321. Zeller, O.
Beginn der Blütenphase bei den Infloreszenzknospen einiger Kern- und Steinobstsorten. **(The initiation of flower bud differentiation in some pome and stone fruit varieties.)**
Angew. Bot., 1954, **28**: 178-91, bibl. 23, illus.

Data are tabulated on the initiation of flower bud differentiation in 9 apple, 4 pear, 3 cherry varieties and 1 peach variety. *Malus baccata* and *Prunus avium* were also studied. The duration of the period of flower bud initiation was shown to range from 4 to 13 weeks, according to the variety and the type of fruiting wood (spurs or shoots with short internodes) examined. That is much longer than is generally supposed. In the case of spurs a relationship was shown to exist between the cessation of their growth and the beginning of flower bud differentiation, short internodes being "post-inflorescence" buds, which give rise to a second bloom of pome fruits, revealed that these may begin to differentiate at any time during the winter. In pears "post-inflorescence buds" yielded eatable, parthenocarpic fruits having about half the weight of normal fruits.—Inst. f. Obstbau. u. Gemüsebau, Landw. Hochschule Stuttgart-Hohenheim.

1322. Schmidt, M.
Mehrjährige Beobachtungen über den Blühbeginn von Apfelsorten. **(Several years' observations on the start of flowering of apple varieties.)**
Arch. Gartenb., 1954, **2**: 355-84, bibl. 13.

Phenological observations were made on the flowering of 271 apple varieties in Bavaria between 1935 and 1941. Most trees were bushes on Doucin, and generally groups of 2 or 3 trees of each variety were studied. There was considerable yearly variation in flowering time. The flowering date of the earliest variety was shown to have some relation to the total flowering period of all varieties, the earlier the first flowering the longer was the total flowering period. Flowering normally occurred between 122 and 128 days after 1 January. There was no relationship between the start of flowering and the sum of temperatures between 1 January and flowering. The yearly variation in flowering appeared to depend on the amount of temperature sums and the average temperature experienced in the few weeks before flowering by the fully developed buds. There was also a certain "shock" effect of temperature, and most of the flowering started after a considerable rise in temperature. The average flowering times of the varieties tested are listed and compared with that of Pfirsichroter Sommerapfel ; most of the varieties belonged to the mid-season group.

1323. Kemmer, E., and Thiele, I.
Entwicklungsfragen bei Apfelgehölzen. **(Developmental problems in apple trees.)**
Züchter, 1954, **24**: 346-52, bibl. 14, illus.

The theory of a fixed "juvenile" form in apples, as propounded by Passecker [*H.A.*, 14: 1505, 18: 1625, 22: 3423] and Fritzsche [*H.A.*, 18: 1626], comes again under heavy fire from Kemmer and his school [see also *H.A.*, 20: 2348, 21: 3274, 23: 2574]. The well-illustrated cases, quoted from the authors' experimental material, add weight to their argument that the phase theory is not acceptable as formulated at present. The paper includes new observations on leaf modifications, on flower formation in the allegedly sterile zone, on the shortening of the "juvenile" period by cultural treatment and on the lack of constancy in the adult phase. M.IX, much canvassed in this controversy, displays, in the authors' view, symptoms of both the juvenile and adult phases simultaneously.—Tech. Univ., Berlin-Charlottenburg.

1324. Reeve, R. M.
Histological investigations of texture in apples. II. Structure and intercellular spaces.
Food Res., 1953, **18**: 604-17, from abstr. in *Biol. Abstr.*, 1955, **29**, No. 1631.

Diameters of outer and inner flesh parenchyma cells, respectively, averaged for 5 varieties: Delicious, 161–170; Gravenstein, 221–235; and about 190–210µ for Newtown Pippin, Rome Beauty, and Winesap. Flesh parenchyma cells tended to be spherical while core parenchyma cells were slightly elongated and of larger average size in all varieties. Percentage of flesh tissue occupied by intercellular spaces average between 20 and 22 for Delicious, Newtown Pippin, and Winesap, slightly over 25 for Gravenstein, and about 23–24 for Rome Beauty. Intercellular spaces in all varieties ranged greatly in dimensions, from about 250 to over 600µ for the flesh parenchyma, and tended to be radially elongated. Amount of cell wall surface per c.c. of flesh parenchyma was computed as 190 cm.^{2} for Gravenstein, 283 cm.^{2} for Delicious, and about 230 cm.^{2} for the other 3 varieties. The distinctions in structural characteristics reflected physiological differences in metabolism and seasons of growth and ripening. Through such varietal distinctions, variations in amounts of cell wall surface and composition of middle lamellae result and contribute to the different textural qualities that apples exhibit. [From author's summary.]

1325. Miličič, D.
The anatomical structure of the epicarp of the peach and some particularities in the mesocarp.
Acta Botanica, 1949, **12-13**: 207-26, abstracted in *Bull. sci. Cons. Acad. RPF Belgrade*, 1953, **1**: 121.

The anatomical structure and development of the epicarp of *Prunus persica* var. *vulgaris* and var. *nucipersica* are described.

Pollination.

1326. Jacopini, P.
L'uso del biselenito come rapido indicatore della germinabilità del polline. **(Sodium biselenite as a rapid indicator of pollen viability.)** [English summary 8 lines.]
Riv. Ortoflorofruttic. ital., 1954, **37**: 433-7, bibl. 20, illus.

In recent experiments at the Arboricultural Institute, Florence, treatment with 2% sodium biselenite for periods ranging from ½ to 2 hours according to species proved a rapid and reliable means of determining pollen viability in stone and pome fruits, especially the former. Grains with full germinative power turned brick red, those with weak germinative power turned pale yellow and non-viable grains did not change colour.

1327. CHAUX, —.
Figuier. Étude de caprification. (**Figs. Caprification studies.**)
Rapp. Cons. Exp. Rech. agron. Algér. 1953, 1954, pp. 200-10, and note in *C.R. Acad. Agric. Fr.*, 1954, **40**: 643-4.

A key for the identification of the chief caprifig varieties in the Kabylie region is given. Tests showed that mammoni production was hastened by about 12 days by pinching out the shoot tips. It was shown that the profichi remained active for about 48 hours in caprification, and that the majority of the fig wasps left the fruit in the early hours of the morning.

Spraying for cultural purposes.

1328. LALATTA, F.
Prove di diradamento del pesco S. Anna Balducci. (**Thinning trials on the peach variety S. Anna Balducci.**) [English summary 6 lines.]
Riv. Fruttic., 1954, **16**: 126-39, bibl. 16.

Flower thinning with DNO sprays and early and late hand thinning of fruitlets were compared in tests on S. Anna Balducci peach trees at Ravenna in 1952-54. DNO spraying (0·15% Sandolina) effectively reduced fruit set and can be used as a preliminary to hand thinning of fruitlets. Two sprays are recommended, one at 70% blossom and the other at full blossom. Early hand thinning of fruitlets within a month of full blossom was more satisfactory than late (7–8 weeks after full blossom, i.e. after the June drop), giving greater yield and fruit size and increasing vigour. Full experimental data are given.

1329. DAVISON, R. M.
Effect of thinning sprays on storage quality of Sturmers.
Orchard. N.Z., 1954, **27**: 5.

Certain secondary effects of α-NAA thinning have become apparent on Sturmer in storage. There has been an early appearance of breakdown in such fruits. There are indications that dinitro sprays may be satisfactory thinning agents for this variety.

1330. HOFFMAN, M. B.
Thinning apples with hormone sprays.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 137-41, bibl. 2.

A product containing naphthylacetamide was offered for commercial use as an apple thinning agent in 1953. This is the first time that a chemical has been formulated specifically for thinning apples. The amide is closely related to naphthaleneacetic acid but trials have shown that it is a milder thinning agent and probably safer to use under many conditions. Recommendations are made concerning the time of application.—Cornell Univ., Ithaca.

1331. HOFFMAN, M. B.
Hormone sprays for controlling pre-harvest drop.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 142-7.

Factors affecting the results of pre-harvest drop spraying of apple trees are discussed, and the effectiveness of 2,4,5-trichlorophenoxypropionic acid and 2,4,5-trichlorophenoxyacetic acid are compared. The former has a greater stimulatory effect on ripening.

1332. TENEMBAUM, L. I.
El raleo químico de la fruta. (**Chemical thinning of fruit.**) [English summary and conclusions ½ p.]
Rev. Fac. Agron. Eva Perón, 1954, **30**: 51-7, bibl. 9.

In experiments on Gravenstein and Reine des Reinettes apple trees in 1953/54, 12·5 p.p.m. DNOSBP applied at full blossom destroyed the flowers completely, while 20 p.p.m. α-NAA applied just after full blossom and 13 days later destroyed nearly 50% of the flowers and improved the size of the fruit.

Pruning and training.

(*See also* 1429, 2264.)

1333. HILKENBÄUMER, F., MEIER, G., AND REICHEL, M.
Schnitt der Obstgehölze mit Umveredlungsverfahren. (**The pruning and re-working of fruit trees.**)
Verlag J. Neumann-Neudamm, Melsungen, 1954, 3rd edition, 6½ × 4½ in., pp. 144, illus., being *Arbeitsmerkheft* **4/5.**

For a note on the first edition see *H.A.*, 20: 1336. The simple and efficient principle of illustrating tools, methods and tree shapes by line drawings—partly with a second colour—has been retained, and the number of pictures has been increased to include peach and vine pruning.

1334. STANČEVIĆ, A. S., AND MIŠIĆ, P. D.
Medjusobni uticaji nadzemnih i podzemnih organa kod kruške dvorui. (**Reciprocal effects of aerial and underground organs in the pear variety Dvorui.**) [English summary ½ p.]
Arh. poljopr Nauk., 1954, **7** (16): 102-7, bibl. 6.

The crowns of 2-year-old pear trees, variety Dvorui, on wild pear (*Pirus communis*) were formed at 90 cm. high by 4 different methods. Trees trained to a single branch and consequently having a small leaf area produced the weakest root systems with the minimum number of roots; they also had the thinnest stems. Unrestricted branching of control trees, giving a large leaf area, resulted in the best developed root systems and thickest stems. Two methods of controlled crown formation to 6 branches reduced both root and top growth below that of the controls. On the basis of these results it is considered desirable that young pear trees should be pruned only very lightly.

1335. BRYNER, W.
Umpfropfen einmal anders. **(A different method of frameworking [fruit trees].)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 70-3, illus.

The methods of frameworking fruit trees described and illustrated include one particularly well suited to espalier trees with closely spaced leaders. Short scions are rind-grafted horizontally onto perpendicular branches by lifting the bark in as many places as convenient. Where the branches are very thin the scions are best inserted by tapping with a hammer.

Soil management.

(*See also* 1373p, 2279.)

1336. REBOUR, H.
La pratique de la fumure en couronne des arbres fruitiers peut être avantageusement modifiée. **(The practice of fertilizing fruit trees "en couronne" can be beneficially modified.)**
Rev. hort. Paris, 1954, **126**: 1157-8, illus.

Fertilizing fruit trees "en couronne", by placing fertilizer in a trench dug round the tree at the leaf-drip edge, destroys many of the roots. A new method of fertilizing is suggested in which the fertilizer furrows are made between every other row. In the second year furrows are dug in previously unfertilized alleys, while in the third and fourth years they are made in a similar way across the plantation. By this method fewer roots are destroyed.

1337. STALÉ, J.
Expériences dans la fumure des arbres fruitiers. **(Fruit-tree manuring trials.)**
Publ. Stat. féd. Ess. agric. Lausanne **432**, 1953, pp. 138-52, bibl. 6, illus.

The principles of orchard manuring are discussed. Dying back of Reinette du Canada apple trees in the Valais Canton has been studied. Some improvement has been obtained by heavy manuring and cutting back of the trees, but the problem is not yet solved.

1338. SMIRNOV, N. M.
Biological method of overcoming biennial bearing in apples. [Russian.]
Sad i Ogorod, 1954, No. 11, pp. 37-42.

The author maintains that blossom bud formation is not limited to 2 decades in July. By applying frequent side dressings, particularly of N, conditions favourable for fruit bud formation are created throughout the growing season, thus ensuring adequate blossom for the following season.

1339. MORITA, Y., AND OTHERS.
Effects of soil conditioners on physical properties of soils in relation to the growth of peach seedlings. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **23**: 82-90, bibl. 4, illus.

A study was made on the effect of the soil conditioner Aerotil A-22 on peach seedlings growing in a loamy soil overlying a subsoil having a total pore space and air capacity of 50% and 3% respectively. The 10 treatments included broadcasting without cultivation and with deep cultivation. No significant differences in soil moisture and aggregation were observed, but it was concluded that the conditioner could profitably be used in the nursery to prevent crust formation.

1340. WILLIAMS, H. R.
Standard swards for orchards.
Comm. Gr, 1954, No. 3078, pp. 1261-2, illus.

Dwarf growing Timothy-S.50 is recommended as a suitable grass for an orchard sward. It does not compete with tree growth in spring, is low-growing and gives good ground coverage in July and August. A suggested standard mixture for orchard swards includes timothy, red fescue, white clover and wild white clover.

1341. SELL, W. J.
Straw mulch in the orchard.
J. Dep. Agric. Vict., 1954, **52**: 495-6.

An oat straw mulch was applied to pear, apple and peach trees growing in a sandy loam. An annual fertilizer dressing of 2: 2: 1 was given. In the sixth year, after 8 weeks of dry weather, Gravenstein trees had greener foliage and larger, better-coloured fruits than those on unmulched plots. A general increase in yield was apparent after the first year of mulching, and yields were doubled after 6 years. Biennial bearing in Pomme de Neige was reduced in mulched plots, and yields averaged over 2-year periods were trebled.

1342. HARLEY, C. P.
A new look at apple tree mulching.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 184-8, bibl. 1.

Information is given on the value of mulching with high-nitrogen hay for restoring the vigour of devitalized apple trees. In tests at Beltsville, Md, any hay crop containing 2% or more N on a dry weight basis was found to be satisfactory for this purpose, and to be markedly superior to cereal straw. Decomposition and release of nutrients proceeded at a higher rate in high-N than in low-N hay during most of the year following application. The manurial value of the high-N hay was higher in respect of N, P, Ca and Mg. Leaf analyses showed that there was no significant difference in the dry weight percentages of N, Ca or Mg between trees mulched with high-N hay, those mulched with wheat straw and those unmulched in sod. Percentages of P and K, however, were consistently higher in the leaves of hay-mulched trees. On the basis of actual amounts of nutrients (mg. per leaf), the hay-mulched trees contained significantly higher amounts of all the elements than the straw-mulched or sod trees. Analyses for Bo, Fe, Cu and Mn showed a similar pattern. The higher values in actual amounts per leaf in the hay-mulched trees are the result of larger and heavier leaves, and indicate that these trees had a greater capacity to absorb and utilize nutrients.

1343. BOYNTON, D.
A new look at apple tree mulching.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 189-92.

In a 5-year experiment with vigorous, productive McIntosh trees on fertile soil, 3 levels of mulching with 3 levels of N fertilization were compared in all combinations. Low-N hay was applied in late summer each year at the following levels: (1) none, (2) a light cover permitting grass to grow through it, (3) a heavy cover which smothered practically all the grass growth. The average results over the whole period showed that both mulch and N increased total yields. Trees receiving no mulch and no N yielded least, and those receiving high mulch and high N yielded most. The increase in yield was accompanied by an increase in terminal growth, tree girth and N content of leaves. Pre-harvest drop was also increased and red colour and fruit firmness were decreased. These were all essentially N effects. In addition, mulching increased fruit size slightly as a result of conservation of moisture, and increased the K level of the trees but not the Ca, Mg or P levels. It is considered that light annual applications of mulch are better than heavy applications at intervals of several years. The cost per tree for mulching, however, was nearly double that for a sod-fertilizer programme. The practice is therefore considered uneconomic for healthy orchards on fertile soil and should be limited to orchards or parts of orchards on shallow, eroded or infertile soil.—Cornell University, Ithaca.

1344. Hewetson, F. N.
Rejuvenation of an old apple orchard by means of fertilizer, mulches and cover crops.
Bull. Pa agric. Exp. Stat. **585**, 1954, pp. 33, bibl. 27, illus.

Treatments which were designed to rejuvenate an old apple orchard included the use of three rates of fertilizer applications which crossed over straw and pea vine mulch plots and ladino and bluegrass cover crop plots. The higher fertilizer applications were effective in increasing trunk area, cover crop weights, leaf weight, nitrogen and chlorophyll content of the leaves, shoot growth, and finally yield, in that relative order. The effects on growth were in proportion to the amounts of fertilizer used. The increase in leaf weight, leaf nitrogen, and chlorophyll stimulated tree growth which in turn increased yield. Among the mulch and cover crop treatments, pea vines were outstanding in their beneficial effect on tree performance. This effect was more apparent in the low than in the medium or high fertility plots. A program of rejuvenation, as conducted under the conditions of this experiment, would give temporary economic benefits. Over a long period of time, however, a tree removal and replanting program might be more profitable. [From author's digest.]

1345. Visser, A.
Invloed grondsoort en grondwaterstand in de fruitteelt. (**The influence of soil type and water table on fruit-growing.**)
Fruitteelt, 1955, **45**: 88-91, illus.

A survey of tree growth in June was made on 3 farms on a clayey area in North Holland with regard to the level of the water table. In 8-year-old Bramleys on M.IV, an increase of 19 cm. in depth of water level was reflected in increases in trunk growth of 13 cm., in height of 0·95 m., and in spread of 1·15 m. With 9-year-old James Grieve on M.I and XIII there was a general tendency for poorer growth at high water tables. Growth of Golden Delicious on M.IV was fairly good at 63 cm. but only moderate at 55 cm. Manks Codlin on M.XI or XIII grew well at 66 cm., but was moderate to poor at 60 cm.

Harvesting.

(*See also* 1373e.)

1346. Loewel, E. L., and Schmitthenner, —.
Pflückversuch mit verschiedenen Obstpflückkiepen in Ottensen. (**Picking studies with different fruit picking baskets in Ottensen.**)
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 26-30, illus.

Picking baskets which may be emptied from the bottom by means of adjustable sacking were compared with baskets closed at the bottom and emptied by hand. Landsburger Renette, when carefully emptied into boxes by hand, had 98·5% undamaged fruits. When emptied through the bottom of the baskets the amount of undamaged fruit varied from 36·8% to 65%. Emptying by hand, however, took 2 minutes per basket, while emptying the fruit through the bottom took ½ minute per basket.

1347. Pearce, W. L.
The economics of pear harvesting.
Fruit World, Melbourne, 1954, **55** (11): 13-15.

Several aspects of harvesting are discussed, namely, contract or day labour, preparation for picking, sorting, transport and timing the first pick. The estimated costs of picking 1 ton of fruit in the Shepparton area in 1954 total £6 8s. 3d.

1348. Douglas, W. S.
Harvesting Santa Rosa plums.
Decid. Fruit Gr, 1954, **4**: 252, plus colour chart.

A colour chart shows 8 stages in the ripening of Santa Rosa plums, and the stages at which they should be picked for export, early in the season and later, are indicated. Irrigation should cease at the first sign of colour development. No fruit should be packed for export for at least 2 days after rain. Hints are also given on packing.

Grading, packing and drying.

(*See also* 1373i, j, 2314b, c.)

1349. Conway, T.
Bulk handling of fruit.
N.Z. J. Agric., 1954, **89**: 459-63, illus.

Wooden bins, capable of holding 50 bushels of apples, are used by a Hawkes Bay grower for transporting fruit from orchard to packing shed, instead of picking boxes. In the packing shed a hoist and gantry transfers the bins from the tractor trailer to the grading table.

1350. Anon.
Dutch grader deals with eleven sizes.
Grower, 1955, **43**: 375-7, illus.

Two machines are described which both grade and size fruits, and have been used with apples, pears, plums and tomatoes. Grading is done first on belts which then carry the fruits past a series of adjustable sizing blocks. The fruits roll under these to the packing-table compartments. All belts and fittings are padded with sponge rubber. A machine to sort into 7 sizes with 2 grades would cost about £300. There is also a range with V-shaped belts and shaped blocks, which would be more suitable for pear grading. It is claimed that damage is entirely excluded and accuracy is complete.

1351. Bloomfield, J. S.
The preparation of fruit for marketing.
J. Agric. W. Aust., 1954, **3**: 77-84, 179-86, 557-76, illus.

In Western Australia the bulk of the apple and pear crop is exported to Europe or to Singapore. Cold stores are chiefly at the export ports, thus all fruit must be packed by the growers soon after picking. The first article deals with packing shed design and equipment. In the second handling, grading and sizing are discussed. In the third fruit packing is described, and Department of Agriculture charts for packing apples, plums and citrus fruits are reproduced.

1352. Brunk, M. E.
Retail movement studies point the way to greater apple sales.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 43-7.

Research that has been done at Cornell University since 1948 on apple marketing is reviewed, and current activities are described. A combination of the 6-lb. package and bulk display has so far proved the most effective marketing practice.

1353. Bennett, A. J.
Australian dried tree fruits.
Quart. Rev. agric. Econ., 1954, **7**: 177-82.

Commercial drying of prunes, apples, apricots, peaches and pears is fairly widespread in south-eastern Australia. Eight per cent of Tasmania's apple crop is dried, and this forms 95% of Australia's total dried apple production. Prunes are quantitatively the most important dried fruit, 70% of the total production coming from New South Wales, and 17% from South Australia. Much of the prune crop is sun-dried, and marketing is generally as a wet pack. The production of dried apricots, peaches and pears is fluctuating, and depends on the state of the fresh and canning markets. Dried fruit marketing is organized by state boards which fix the quantities of fruits to be sold in the states, and maintain a certain quality in the pack. The principal export markets are the United Kingdom and New Zealand.

1354. Service de l'Horticulture, Maroc.
Les chantiers-pilotes de séchage de figues en milieu marocain. **(Fig-drying demonstration centres in Morocco. 1954 season.)**
Terre maroc., 1954, **28**: 458-64, illus.

Demonstration centres for the sun-drying of figs were first opened in Morocco in 1952. Figs dried by this method in 1953 kept better than most others and at the beginning of the 1954 season fetched 5 fr. per kg. more in the markets. In 1954 9 centres were in operation in Fez and Rabat and 20,000 kg. of figs were treated compared with 4,000 in 1953.

Storage.

(*See also* 1373 l.)

1355. Rubin, B. A.
The biochemistry of fruit and vegetable storage. [Russian.]
Priroda, 1954, **43** (12): 62-6, illus.

Biochemical changes occurring in stored fruits and vegetables, and conditions of plant material and storage affecting them, are discussed.

1356. Nyhlén, Å.
Kyllagring av äpple. Fruktlagringsnämndens undersökningar 1953-1954. **(Cold storage of apples. Studies of the Fruit Storage Committee 1953-1954.)**
Fruktodlaren, 1954, No. 4, pp. 106-7.

The main emphasis in the 1953/54 report on the annual cold storage trials at Helsingborg is *Gloeosporium* rot. With Cox's Orange losses from this disease to the beginning of March amounted to 51·8%, as against 3·4% in Laxton's Superb; in 3 other varieties studied losses were intermediate. Work on the biology and control of the fungus is in progress at the Swedish Plant Protection Institute, Stockholm.

1357. Nyhlén, Å.
Hållbarheten hos stora och små äpplen. **(The storage life of large and small apples.)**
Fruktodlaren, 1954, No. 5, pp. 134-7.

The storage life of fancy-grade Cox's Orange apples was found to be inversely related to size, the size groups being 55–60, 60–65, 65 and 65–70 mm. Differences between large and small fruits were so considerable that it was thought desirable to publish preliminary results from one year's trials carried out at the cold storage plant, Helsingborg.

1358. Hall, E. G., and Sykes, S. M.
Effects of skin coatings on the behaviour of apples in storage. IV. Comparisons of skin coatings and gas (controlled atmosphere) storage.
Aust. J. agric. Res., 1954, **5**: 626-48, bibl. 17, illus.

The effects on apples of gas (controlled atmosphere) storage and of skin coatings in refrigerated storage have been compared using the varieties Jonathan, Delicious and Granny Smith. Although with Delicious gas storage was somewhat better than coating, the gain by either method was small. With Granny Smith coatings were generally more successful than gas storage. This was due to better control of superficial scald and senescent scalds. Both gas storage and skin coatings prolonged storage life, primarily by increasing the carbon dioxide tension and decreasing the oxygen tension inside the apple. However, differing effects on the volatile products of metabolism, other than carbon dioxide, caused important differences in the behaviour of the fruit. [Authors' summary. For Parts I, II and III see *H.A.*, 23: 2663 and 24: 1225 and 1226.]

1359. Ulrich, R., and Leblond, C.
Influence de divers emballages (papiers, huilés ou non, polyéthylène) sur le comportement au froid des pommes de la variété "Belle de Boskoop". **(The effect of different wrapping materials (oiled or unoiled paper, polyethylene) on the reaction to cold of Belle de Boskoop apples.)**
C.R. Acad. Agric. Fr., 1954, **40**: 690-3, bibl. 1.

Fruits picked on 15 and 21 September were given 7 packaging treatments, and stored for 8½ months at 4° [C.]. Water loss during storage was least in fruits in polyethylene bags. There was little apparent ripening, judged by colour and taste, of fruits stored in these bags, although later at room temperature the process was rapid. The best apples at the end of the storage period were the controls, which were unwrapped, those in ordinary, unoiled wrappers and those in oiled paper shavings. Scald was more apparent in fruits of the first than in those of the second harvest; fruits in polyethylene bags of 5/100 mm. thickness had the same amount of scald as control fruits. There was a relatively high amount of scald among fruits in oiled wrappers.

1360. Dana, M. N.
Prevent loss of quality by using polyethylene for apple storage.
Wis. Hort., 1954, **45**: 67-9, illus.

Samples of Golden Delicious, Secor and Sanderson apples were packed in polyethylene liners or in conventional packs and stored at 40° F. and 40% humidity. Fruit of all varieties had a much longer storage life in the liners than in conventional packs; a small sample of Golden Delicious was still in excellent condition 6 months after the control was judged unmarketable.

1361. Siegelman, H. W., and Schomer, H. A.
Effect of scald on apple skin respiration.
Plant Physiol., 1954, **29**: 429-31, bibl. 5.

The respiration of normal and scalded apple skin was compared. The volatiles in the atmosphere of a commercial apple store had no effect on the O_2 uptake of the skin tissue. Severely scalded skin had a reduced O_2 consumption and CO_2 production in air and in nitrogen. Respiration in scalded skin appeared to be reduced quantitatively rather than qualitatively.

1362. Henze, R. E., Baker, C. E., and Quackenbush, F. W.
Fruit storage effects. Carbonyl compounds in apple storage volatiles.
J. agric. Food Chem., 1954, **2**: 1118-20, bibl. 16.

Carbonyl compounds have been determined in apple storage volatiles collected on activated carbon in a commercial refrigerated apple storage. Acetaldehyde, acetone, and propionaldehyde have been definitely identified. Fifteen other carbonyl compounds have been separated chromatographically as their 2,4-dinitrophenylhydrazone derivatives, and their absorption spectra are presented. [Authors' summary.]—Agric. Exp. Stat., Purdue Univ., Lafayette, Ind.

1363. Ulrich, R., and Paulin, A.
Sur la maturation des poires Passe-Crassane. **(The ripening of Passe-Crassane pears.)**
C.R. Acad. Agric. Fr., 1954, **40**: 603-4, bibl. 2.

Fruits of Passe-Crassane picked at the beginning of October were stored at several temperatures, with and without ethylene. Ripening at 4° [C.] was normal. At 0° ripening was incomplete but normal ripening occurred, after at least 4 weeks storage, on exposure to warmth (18°), or after a few days storage at 0° C. as the result of warmth plus ethylene. The longer the period of storage at 10°, 15° and 18° the more injurious was it, subsequent ripening being incomplete or abnormal when fruits were transferred to 18°, though the presence of ethylene in the storage atmosphere improved subsequent ripening, provided the fruit had been stored for a few days only.

1364. Culpepper, C. W., Lutz, J. M., and Moon, H. H.
Handling and commercial utilization of the Kieffer pear.
Circ. U.S. Dep. Agric. **941**, 1954, pp. 16, illus.

The Kieffer pear, which is widely grown in the United States, is hard and coarse when freshly picked. For the best ripening results the fruits should be picked after they reach $\frac{2}{3}$–$\frac{3}{4}$ of their full size, or when registering 13–14 lb. with the Magness and Taylor pressure tester. The fruit may be stored for up to 90 days at 32° F. before ripening at 60–65° F. At 60° F. ripening takes place in 16–20 days. The composition of the fruit at harvest time and after 20 days storage is given. Ripened fruits are important for the canning industry, and may also be used for preserving and drying.

Composition of leaves and fruit.

(*See also* 1208.)

1365. Honda, N., and Okazaki, M.
Studies on hydrogen-ion concentration and buffer action of leaf-juices from fruit trees including the chestnut. [Japanese, with English summary $\frac{3}{4}$ p.]
Sci. Rep. Fac. Agric. Okayama Univ., 1954, No. 5, pp. 10-19, bibl. 38.

The pHs of the leaf saps of 8 out of 14 fruit-tree species studied ranged from 5·2 to 6·2 (normality), those of walnut, pecan and fig were 6·54–7·13, and those of vinifera and labrusca vines and *Prunus mume* were 3·12–3·69. The 14 species were classifiable into 3 groups according to the buffer-index curves of their leaf sap, viz. (1) typical L-shaped curves—natsudaidai orange, unshiu orange and *Prunus mume*; (2) nearly L-shaped curves—vinifera vine, loquat, peach, fig, labrusca vine, olive; (3) U-shaped curves—pecan, walnut, Japanese and Chinese chestnut and persimmon. The buffer action of the leaf sap of the different species is discussed.

1366. Hulme, A. C.
A new amino-acid in the peel of apple fruits.
Nature, 1954, **174**: 1055-6, bibl. 4.

A new amino-acid has been isolated from the peel of immature fruits of Worcester Pearmain and mature fruits of Edward VII. It is not present in the "pulp" of varieties examined. It is suggested that the acid is a methyl-hydroxyl-proline.

1367. Urbach, G.
A new amino-acid from apples.
Hulme, A. C., and Steward, F. C.
Infra-red spectra of the new proline derivative from the apple.
Nature, 1955, **175**: 170-1, bibl. 3, and 171, bibl. 3.

One of the unidentified amino-acids in dormant apple twigs referred to in an earlier paper [*H.A.*, 24: 1212] has now been tentatively identified as 4-hydroxymethylproline. The second paper confirms that the substance is a proline substituted with both methyl and hydroxyl groups, but does not finally determine its structure.—C.S.I.R.O., Melbourne, and Dep. Bot., Cornell Univ., N.Y.

1368. WOHLMUTH, N.
Die chemischen Inhaltsstoffe reifender Früchte. (**The chemical composition of ripening fruit.**) [English, French and Spanish summaries ½ p. each.]
Mitt. Klosterneuberg, Ser. B, 1954, **4**: 235-49, bibl. 11.

Fruits of wild and cultivated forms of apple, pear, cherry and plum were analysed, and their chemical contents studied in relation to fruit development. Differences between wild and cultivated forms were apparent in fruit size and in length of the developmental period, but all fruits went through 3 stages. Stage 1 was characterized by the deposition of stable constituents, while dry weight increased steadily and starch storage continued. In stage 2 fruit acids and tannins increased, and there was a rise in water uptake so that percentage dry weight decreased. Sugar formation began in stage 3 and the percentage of free acids decreased. In the apple Wintergold parmäne, the content of N was highest in mid-July and then decreased. K content was highest after the June drop, then it decreased, to increase again finally in the third stage. Phosphoric acid content reached its maximum in pome fruits between mid-July and mid-August; in stone fruits ripe fruit contained the most phosphoric acid.

1369. JOSLYN, M. A., AND SMIT, C. J. B.
Trennung der Tannine und verwandter Polyphenole des Obstes auf einer Kolonne von Silicagel. (**The separation of tannins and related polyphenols in fruits on a column of silica gel.**) [English, French and Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1954, **4**: 141-7, bibl. 14.

To classify the tannins and related polyphenols of fruits a survey of the more important deciduous fruits was made. The polyphenols present in alcohol extracts were separated by lead precipitation and silica gel chromatography and tentatively identified by absorption spectroscopy. The tannins and polyphenols were classified into 4 groups according to their absorption spectra: substances similar to caffetannins such as chlorogenic acid (max. 320–330 mμ), those similar to catechins (max. 270–280 mμ), those similar to polymers of catechins or phlobatannins (max. 270–280 mμ) and those which showed some resemblance to flavones (max. 250–260 mμ). This survey showed the presence of all four of these groups in unripe apples, unripe apricots, grape juice, unripe or ripe peaches, unripe pears and unripe prunes. In avocados and unripe pomegranate juice evidence was found for the presence of polyphenols resembling catechins and flavones, and olives showed the possible presence of catechins only. [Authors' summary.]—Berkeley, Calif.

1370. DALBRO, S., AND GUMPEL, H.
Forskellige lagringsmetoders indflydelse på C-vitaminindholdet i aebler samt undersøgelser over ascorbinsyreindholdet i forskellige baerfrugtsorter. (**The effect of method of storage on the ascorbic acid content of apples, and studies on the ascorbic acid content of some berry fruits.**) [English summary ¾ p.]
Tidsskr. Planteavl., 1954, **58**: 265-77, bibl. 14.

Cox's Orange and Bramley's Seedling apples were kept in common ventilated storage, cold storage (3° C.) and gas storage (4·5 C.) during the winters of 1949–50 and 1952–53, and the loss of vitamin C was determined at several dates between October and April. The data show that in Bramley's Seedling the decrease in vitamin C content was slow, especially in common ventilated and cold storage, and the effect of 12 days' exposure to 20° C. after the completion of the storage period was slight, while in Cox's Orange the decline in vitamin C was rapid with all types of storage and 12 days' exposure to 20° C. had a very deleterious effect. It is suggested that certain varieties may contain vitamin-C-preserving substances. Fruits of both Cox's Orange and Bramley's Seedling picked from the sunny side of the tree had a higher vitamin C content than those from the shaded side. Figures are also given on the vitamin C content of several black currant, strawberry, raspberry and highbush blueberry varieties. The English summary provides a key for the interpretation of the tables and graphs.—Blangstedgaard.

1371. AXELROD, B., AND SEEGMILLER, C. G.
Metabolism of apples, conversion of glucose to sucrose in apple tissue.
J. agric. Food Chem., 1954, **2**: 1329-31, bibl. 17.

When radioactive glucose was infiltrated into apple discs, radioactive sucrose, but not free fructose, was formed. The process was inhibited by the exclusion of oxygen. Most of the activity was found in the glucose portion of the sucrose molecule. [From authors' summary.]

1372. CLARK, D. S., WALLACE, R. H., AND DAVID, J. J.
Yeasts occurring on apples and in apple cider.
Canad. J. Microbiol., 1954, **1**: 145-9, bibl. 23.

The yeasts isolated from apples grown in Quebec were members of the genera *Candida*, *Cryptococcus*, *Rhodotorula* and *Torulopsis*, species of *Candida* being predominant. The yeasts isolated from cider were representatives of the genera *Debaryomyces*, *Pichia* and *Saccharomyces*. Over 50% of the cultures isolated from the cider, and all those from the apples, were nonfermenters.—McGill Univ., Quebec.

Noted.

1373.

a ANON.
Eksportregler for aebler og paerer. (**Regulations for the export of apples and pears [from Denmark].**)
Erhvervsfrugtavl., 1954, **20**: 327-30.
On grading and packing.

b BAUMEISTER, G.
Der Apfelanbau in Japan. (**Apple growing in Japan.**)
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 335-49, bibl. 4, illus.

c Breviglieri, N.
La coltura dell'albicocco in California. (**Apricot growing in California.**) [English and French summaries 6 and 5 lines.]
Riv. Ortoflorofruttic. ital., 1954, **37**: 404-23, bibl. 13, illus.

d Commonwealth Economic Committee.
Fruit. A review of production and trade relating to fresh, canned and dried fruit, fruit juice and wine.
[*Publ.*] *Commonw. Econ. Cttee*, 1954, pp. 164, H.M.S.O. Lond., 5s.

e Dupaigne, P.
Un pénétromètre à sensibilité décroissante. (**A penetrometer of varying sensitivity.**)
C.R. Acad. Agric. Fr., 1954, **40**: 617-19, bibl. 4.
For fruit maturity tests.

f Endt, J. W.
De fruitteelt in Nieuw-Zeeland. (**Fruit-growing in New Zealand.**)
Fruitteelt, 1954, **44**: 1066-9, illus.

g Gellert, C.
Obstabsatz, Verpackung und Verwertung in der Schweiz. (**Marketing and utilization of fruit in Switzerland.**)
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 139-44, 217-21.

h Löhden, A.
Die Organisation des Obstabsatzes in den Niederlanden. (**Fruit marketing in Holland.**)
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 228-33, bibl. 3.

i Ministry of Agriculture, London.
Packing apples in returnable bushel boxes.
Adv. Leafl. Minist. Agric. Lond. **425,** 1954, pp. 7.
Based on work by Hart and Stewart [see *Agriculture, Lond.*, 1950, 57: 236-9, noted *H.A.*, 20: 2389].

j Ministry of Agriculture, London.
Domestic preservation of fruit and vegetables.
Bull. Minist. Agric. Lond. **21**, revised 1954, pp. 105, illus., 3s. 6d.
Including storage of apples, pears and nuts.

k de Mos, D.
Welke perzikrassen telen we in koude kassen? (**Peach varieties for cold glasshouses.**)
Fruitteelt, 1954, **44**: 1082-4, illus.
Listed in order of ripening.

l Reddy, G. S.
Eating quality and keeping quality of fruits as influenced by site and environment.
S. Indian Hort., 1954, **2**: 85-98, bibl. 47.
A review covering temperate and tropical types.

m Siǐmon, A. M.
Achievements of popular fruit selection in the Estonian SSR. [Russian.]
Nauč. Sess. Vopr. Biol. seljsk. Hoz. Riga 1951, Moscow, 1953, pp. 259-67.
Methods used and varieties of top and small fruits developed are described.

n Steyn, P. A. L.
Fruit breeding in South Africa.
Decid. Fruit Gr, 1954, **5** (1): 11-13.
Started 1939 and just beginning to show results.

o Watt, J. H.
Preliminary report on orchards survey: tree fruits section.
N.Z. J. Agric., 1954, **89**: 449-55.
A survey of N.Z. commercial orchards carried out in the winter and spring of 1953.

p Wilson, D. W.
Increasing humus content of Central Otago orchard soils.
N.Z. J. Agric., 1954, **89**: 293-6, illus.
Use of weed growth, cover crops, mulching.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 1204, 1284, 1370, 1425a, b, d, h, 1802c, 2297, 2303.)

1374. Tolmačev, I. A.
Actinidia. [Russian.]
Sad i Ogorod, 1954, No. 12, p. 57.

Actinidias were brought into cultivation in the U.S.S.R. by Mičurin. *A. kolomikta* and *A. arguta* produce edible fruits of high vitamin C content. The former is the more frost resistant and 2 good varieties of it are mentioned. *A. polygama* is an ornamental. All 3 species are propagated most successfully by layers.

1375. Crowley, D. J.
Cranberry growing in Washington.
Bull. Wash. agric. Exp. Stats **554,** 1954, pp. 30, illus.

A detailed account of the normal operations necessary for the successful cultivation of the cranberry, *Vaccinium macrocarpon*, in Washington. It may be noted that sprinkling with water is used to prevent both frost damage and scald from high temperature. Harvesting is done in several ways, e.g. using suction pickers, mechanical pickers, water scooping.

1376. Habran, R.
La culture de la framboise en Haute-Savoie. (**Raspberry growing in the Haute-Savoie.**)
Fruit belge, 1955, **23**: 9-10.

Raspberry growing in this area is carried on by numerous small growers. Varieties grown are of local origin, Bois blanc and Bois rouge. The canes are grown on ridges at 1 m. 50 by 1 m. Two harvests are taken each year. After the first in July the growth is pruned, and a second harvest is taken in September; this is followed by winter pruning. Yields average 6–8 tons per hectare.

1377. Wood, C. A.
Fruit variety trials. II. A trial of raspberry varieties and seedlings at Kirriemuir, Angus.
Scot. Agric., 1954-1955, **34**: 161-5, bibl. 5.

The report summarizes a 4-year trial with Malling Promise, Malling Exploit, Lloyd George and Malling Seedling V. Crop records of the trial show that all gave an average crop of over 3 tons per acre, Malling Exploit and Lloyd George being outstanding. Seedling V gave a lower yield than the rest, but ripened later, which may account for its apparent resistance to grey mould (*Botrytis*). Malling Promise ripened consistently as a first-early variety, while Exploit was a second-early; Seedling V is a late mid-season variety. The choice of variety in this area depends on how the fruit is to be marketed. Malling Promise, Exploit and Lloyd George are excellent for jam; for canning, freezing and fresh fruit markets Lloyd George is preferable.

1378. Lantz, H. L., and Denisen, E. L.
Black Hawk, a new raspberry for the Midwest.
Ia Fm Sci., 1954, **9**: 639-41, illus.

This new variety of black raspberry, *Rubus occidentalis*, is being released after 8 years' trial. Many of its fruits reach ¾ inch in diameter but are firm and stand up well to shipping and quick-freezing. It has given consistently good yields and proved winter hardy. Its vigorous growth necessitates spacing of 3 to 4 ft. by 8 to 10 ft.

1379. Ledin, R. B.
A tropical black raspberry for South Florida.
Circ. Fla agric. Exp. Stats **S-56**, 1953, pp. 12, illus.

No raspberry had been grown with success in South Florida until the introduction in 1948 of a tropical black raspberry, *Rubus albescens* Roxb. This species is native to the mountains of India, Ceylon, Burma and Java, where it is known as the Mysore raspberry. Trial plantings have shown it to be well adapted to the climate and soils of the subtropical areas of S. Florida. Fruit is produced over a 4-month period, March–June. Cultural practices necessary for maximum yields, such as watering, fertilizing, mulching, pruning, staking or trellising, are briefly described. The plants can be propagated by seed, cuttings or tip layers. The comparative freedom of the raspberry from pests and diseases suggests that it may serve as a useful source of resistance in breeding work. [See also *Fruit Var. hort. Dig.*, 1954, 9: 10-11.]

1380. Wood, C. A.
Experiments in raspberry cultivation.
Grower, 1954, **42**: 1111-12.

A spacing experiment with Malling Promise, Lloyd George and Norfolk Giant showed that rows at 5½ feet were more productive than those at wider spacings. When the tipping height of Malling Promise and Norfolk Giant canes was increased, yields were increased though not significantly. There was a significant increase in yield with Lloyd George when the tipping height was raised from 4 to 4½ feet, but yield decreased when the canes were tipped at 5 feet. Double planting (2 canes at each site) increased the yield of all the varieties tested, the greatest increase (about 80%) being in Malling Jewel. Picking at 4- to 5-day intervals did not give so high a yield as picking twice as often.—Scot. hort. Res. Inst.

1381. Hill, R. G., Jr.
Recent developments in small fruit production.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 127-32.

The following developments of research work in Ohio are discussed: *Strawberry varieties.* Fairland has proved the best red stele-resistant variety. *Everbearing strawberries.* The sawdust mulch, spaced plant system has proved profitable on a small scale. *Chemical weed control in strawberries.* The amine salt formulations of 2,4-D and SES (sodium 2,4-dichlorophenoxythyl sulphate) were the most promising of a number of materials tested for summer weed control in strawberries. Their use reduced the total labour requirements for weeding by about half. *Soil management for raspberries.* Mulching with 5–6 inches straw each autumn increased yields of Latham raspberries by an average of 19·25% over a period of 3 years, compared with cultivation combined with cover crops of rye in winter and soya beans in summer. On the mulched plots canes and berries were larger. *Chemical weed control in raspberries.* Effective control of grasses and most winter annual weeds until mid-June, with no observable damage to the crop, has been obtained by autumn applications of Chloro IPC at the rate of 5 lb. in 50 gal. water per acre. This material cannot yet be recommended for commercial use.

1382. Kronenberg, H. G.
Welke aardbeirassen? (**Strawberry varieties for Holland.**)
Fruitteelt, 1954, **44**: 1074-7, illus.

The author surveys some recent strawberry introductions which have been tested in 1954 in different areas in the Netherlands. Macherauchs Frühernte was a very early variety. Regina, Ydun and Bowa showed promise for the fresh market, particularly when grown on clay soils. I.V.T. selection 667 was comparable to Jucunda in being very productive and easy to pick.

1383. Anon.
Pocahontas—a new berry.
Amer. Nurserym., 1954, **100** (9): 81.

This new strawberry variety, a cross between Tennessee Shipper and Midland, ripens about a week later than Blakemore. The fruits are large, a bright to vivid red, with a tough skin and a tart flavour. In a frozen pack test it rated high in colour, texture and flavour. From Washington, D.C., to Norfolk, Va, yields of Pocahontas have been better than those of most varieties.

1384. Guttridge, C. G.
Observations on the shoot growth of the cultivated strawberry plant.
J. hort. Sci., 1955, **30**: 1-11, bibl. 9, illus.

A description is given of the growth and development of the strawberry varieties Royal Sovereign, Auchincruive Climax and Perle de Prague growing outdoors at Long Ashton and at Shinfield, Berks. Growth is sympodial and inflorescences are formed terminally. Inflorescences were found to be first initiated each year in June or July in Auchincruive Climax and in early September in Royal Sovereign and Perle de Prague. Further inflorescences are initiated terminally during late summer and autumn on the crown extension axes. By dormancy in late autumn all axes, except small ones with less than 3 or 4 leaf primordia, are likely to have developing inflorescences. The first formed inflorescences on Climax plants emerge and flower in August and September. Later-formed inflorescences of Climax and all those of Royal Sovereign and Perle de Prague normally remain in the bud until spring. Axillary buds develop into either stolons or branch crown buds. Stolons emerge from the crown as their subtending leaves unfold and expand. Under good growing conditions differentiation and the early stages of stolon formation continue until about the time of inflorescence initiation in Climax and until August in Royal Sovereign. Young stolons in the bud continue to emerge for a further one or two plastochrons. Branch crown buds are formed during the period commencing with the cessation of stolon differentiation and ending with dormancy, or at other times when stolon formation fails. Branch crown buds present on the plant may grow out into branch crowns at any time of the year, but most commonly do so in autumn and spring when the plants are not primarily engaged in producing and supporting young runner plants. Observation suggests that the growing out of branch crowns depends on general vigour rather than on specific requirements of daylength or other climatic factors. [From author's summary.]—[For a preliminary paper on this work see *H.A.*, 22: 3496.]

1385. Robertson, M.
Studies in the development of the strawberry. III. Flower-bud initiation and development in large-fruited perpetual ("remontant") strawberries.
J. hort. Sci., 1955, **30**: 62-8, bibl. 9.

Initiation and development of flower primordia were studied in the "remontant" strawberry varieties Inépuisable, Perle Rose and Libération d'Orléans, using runners of known age and their mother plants. Flowers appearing from late April until about early June were derived from primordia formed in late summer or early autumn of the previous year. Flowers borne from mid- or late July onwards were initiated a few weeks before emergence. Early-formed runners developed flower primordia at an early stage in their growth, and generally flowered in mid- to late summer with their mother plants. Preliminary observations are made on the performance of "remontant" varieties in the East of Scotland. [Author's summary.]—Scottish hort. Res. Inst., Mylnefield.

1386. Darrow, G. M., and Borthwick, H. A.
Fasciation in the strawberry. Inheritance and the relationship of photoperiodism.
J. Hered., 1954, **45**: 298-304, bibl. 1, illus.

Some strawberry varieties are susceptible to fasciation while others rarely, if ever, show it. A tendency to fasciate is inherited by seedlings of susceptible varieties. Trials in which 8 different varieties were exposed to 8 different photoperiods demonstrated that short photoperiods increase fasciation in susceptible varieties. This helps to explain why, under natural conditions, most fasciation is initiated in the autumn and why the trouble is much worse in southern than in northern states of the U.S.A. However, though a short photoperiod is the major factor in producing fasciation, it is clear that other factors, including seasonal variations in growing conditions and the age of the plants, are also involved.

1387. Brooks, A. N.
Refrigeration of [strawberry] plants to stimulate plant growth and runner production.
A.R. Fla agric. Exp. Stats 1952/53, p. 162

Plants received from Northern nurseries and set in Florida during February start making runner plants shortly after setting, so that by June enough runner plants are made for setting on other beds to make plants for fall setting. Florida-grown plants set in February will not do this but are late in making runner plants. Florida-grown plants were given 49, 31, 17 and 0 days' refrigeration at 32° F. and 88–96% humidity just prior to being set on 3 February. Plants received directly from a Northern nursery were set the same day. The Northern plants started runner production a week before those given the 49-day refrigeration. However, the 49-day cooled plants soon caught up and by 15 June, when all runner plants were removed from the bed, runner plant production by the two lots was equal. Runner production by the Florida-grown plants refrigerated for the 3 shortest periods was 2·2 to 12·1 per plant, compared with 22 for the 49-day refrigeration period.

1388. Moulton, J. E.
Strawberry production mechanized in Michigan.
Market Grs' J., 1954, **83** (12): 28-9, 39, illus.

Robinson, Premier and Catskill varieties make up almost the entire acreage of strawberries in the state. Brief notes are given on machines used in crop production. A newly developed digger has a blade which cuts under the row, lifts the plants and conveys them to crates in one operation. Transplanters make it possible to set out several acres of plants a day and also apply starter solutions. Chemical weed control is practised, but power hoes which weed, hoe, place the runners and, when provided with a fertilizer attachment, apply side dressing, are of real value. Mulching is done by a mechanical straw spreader. After harvest a rotor-tiller works the straw into the soil. Irrigation is generally practised and sprinkler irrigation is used for frost control.

Vines.

(*See also* 1183, 1186, 1191, 1275c, 1279, 1281, 1284, 1287, 1369, 1425c, e, f, g, h, 1500, 2097c, 2284.)

1389. le Roux, M. S.
The table-grape industry and the future.
Fmg S. Afr., 1954, **29**: 516, 520.

The South African table-grape industry, which flourished just after the war, has now entered a difficult period. There has been some progress in the last 10 years, notably the adoption of higher and wider trellis systems, green manuring, and the expansion of irrigation and mechanization. On the other hand for want of a market 40–50% of the crop is now used for wine making, varieties are too few and vines are declining as the result of disease and mineral deficiencies. The possibility of diversified farming with stock under the high trellis system, combined with more economic methods of packing and marketing, is worth studying.

1390. Vidal, J.-P., and Roche, R.
Le vignoble indigène du Maroc. **(The native-owned vineyards of Morocco.)**
Progr. agric. vitic., 1954, **142**: 251-5, 279-84, 306-11, 352-6.

The native-owned vineyards of Morocco contain some 23 million vines the grapes of which are mostly eaten fresh or dried and are little used for wine. Notes are given on spacing, total acreage, history, present geographical distribution, phylloxera and measures being taken to combat it, and the manufacture of raisins. More detailed information on cultural practices and varieties in the principal vine-growing districts follows.

1391. Peterson, E. K.
The position and tasks of viticulture in the Latvian SSR. [Russian.]
Nauč. Sess. Vopr. Biol. seljsk. Hoz., Riga, 1951, Moscow, 1953, pp. 252-8.

In Latvia outdoor cultivation of vines is limited by frequent fog and generally high humidity, but production in unheated glasshouses is both successful and economic. Work on growing vines in the open is, however, in progress, and in favourable areas good results are obtained. Varieties for both in- and outdoors are listed.

1392. le Roux, M. S., and Meynhardt, J. T.
Relative berry sizes of table grapes.
Fmg S. Afr., 1954, **29**: 505-7, bibl. 1, illus.

The results are tabulated and discussed of an investigation on the relative berry sizes of 20 table grape varieties grown at Bien Donné, as a basis for deciding whether the present South African export regulations are reasonable. The general conclusion is that, although several varieties are penalized, the regulations are fair with respect to the more important varieties.

1393. La Hulpe.
Station provinciale de Recherches Scientifiques de Viticulture—La Hulpe. Rapport annuel pour l'I.R.S.I.A., pendant 1953. **(La Hulpe Viticultural Research Station. Annual Report for I.R.S.I.A., 1953)**, undated, mimeo, pp. 53.

The hybridization of vine varieties was continued and notes are given on certain fruit and vegetative characters of those growing at Montpellier. Several substances were tested for stimulating fertilization, of which the most successful was potassium iodide at 8 mg./litre added to 1% quaternary ammonium. Potassium iodide alone, and 2,3,5-triiodobenzoic acid were somewhat less effective. Infra-red radiation acted more favourably than ultra-violet rays on the sugar content of grapes. Pollen germination of several varieties was studied after treatment with infra-red and ultra-violet radiation. Gros Colman pollen appeared to give a favourable reaction to U.V. radiation. The germination of Frankenthal pollen was almost doubled by treatments with I.R. rays for 2, 5 or 10 minutes. Five minutes of U.V. acted favourably on Muscat of Alexandria. Pollen from Cannon Hall germinated well when 15 minutes of U.V. was applied after I.R.; U.V. with I.R. for 2 minutes was less favourable. Leaf mould and rotted leather waste appeared to be promising rooting media. The survey of grafts was continued. Gradisca (white) behaved satisfactory on Royal, Leopold III and Muscat of Alexandria.

1394. Baranov, P. A.
The possibilities of extending viticulture into new, more northerly areas. [Russian.]
Nauč. Sess. Vopr. Biol. seljsk. Hoz., Riga, 1951, Moscow, 1953, pp. 243-51.

Mičurin's work on expanding viticulture into northern areas, mainly by acclimatization of seedlings and hybridization of forms of distant geographic origin, is being further developed. Some suitable varieties are listed and the characteristics of 6 of those grown in the Moscow region are described. The climatic and soil conditions of the Baltic region, where frost damage to roots is almost absent, offer wide scope for vine growing.

1395. Cecuk, S.
Vitis silvestris, est-il progéniteur de *V. vinifera*? **(Is *Vitis silvestris* the ancestor of *V. vinifera*?)**
Progr. agric. vitic., 1955, **143**: 37-45, bibl. 18, illus.

The ancestry of the cultivated varieties of vine is of particular interest at present in Jugoslavia since cuttings of *Vitis silvestris* are being sold as *V. vinifera* for rootstocks, owing to the shortage of rootstock material for the reconstitution of the vineyards. The author, who is professor of viticulture at Sarajevo University, agrees with many other authorities that the wild vine is the ancestor of the varieties at present in cultivation. He considers that the resistance to phylloxera and to fungal diseases of the Herzegovina *V. silvestris* is of the same order as that of reverted *V. vinifera.*

1396. Spiegel, P.
Auxin and inhibitors in canes of *Vitis*.
Bull. Res. Coun. Israel, 1954, **4**: 176-83, bibl. 33.

Determination of water, ether and alcohol extracts from vine canes showed that easily-rooting species and hybrids had a much lower growth inhibitor content than those that root less readily. The easily-rooting *Vinifera* × *Rupestris* 1202 gave evidence throughout the winter months of higher rooting percentages and significantly higher curvatures in the *Avena* test than the shy-rooting *Vinifera* × *Berlandieri* 41 B. For most of the winter period the latter had a high inhibitor content which masked auxin effects in unfractionated extracts. A definite correlation was established between the curvature obtained in the *Avena* test with vine cane extracts and the rate of CO_2 output of the cane segments, respiration and auxin activity being consistently higher in the *Rupestris* hybrid than in the *Berlandieri* hybrid. Inhibitor activity ceased at a much later date in the *Berlandieri* hybrid, which showed a much later inception of activity in spring as indicated by late bud swelling, very late rooting and low respiration rate. A sharp rise in respiration rate was noted just before the disappearance of the inhibitor from the neutral fraction of the ether extract. The native auxin in vine canes was identified as indoleacetic acid, and chromatographic evidence suggests the presence of 2 inhibitors. This is the first time that a definite relationship between inhibitor content and rooting response has been established.—Agric. Res. Stat., Rehovot.

1397. MARUTJAN, S. A.
On the difference in peroxidase activity in vine seedlings of different sexes. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **99**: 295-6, bibl. 4.

Examination of the leaves of vine seedlings, variety Astakot, showed that male plants possessed greater peroxidase activity than female plants, and the peroxidase activity of bisexual plants was lower than either. These differences were most marked just before and at the beginning of flowering. Similar differences were not detected in the activity of polyphenol oxidase, catalase or dehydrase.

1398. ANON.
Reunión técnica en el Centro Regional Andino. (**Technical conference in the Andean Regional Centre.**)
Idia, 1954, No. 79, pp. 7-12.

In attempts at Junin Experimental Station in Mendoza province, Argentina, to propagate vine rootstocks which root poorly from cuttings, layering unlignified shoots in December was successful but layering mature branches unsuccessful.

1399. KOSTJUK, JA. E.
"Kiljčevanie" of vine cuttings with biological heating. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 1, pp. 46-50, bibl. 1.

In commercial trials on "kiljčevanie", 26,000 cuttings were used and treated by 3 methods similar to those described earlier [see *H.A.*, 23: 2722]. All the cuttings were stratified in clayey soil with their morphologically upper ends at the bottom of the trench. The best results were obtained by covering them with a 20–25 cm. deep layer of a damp mixture of sawdust and horse manure with a 35–40 cm. deep layer of fresh horse manure placed over it. After about 4 days the temperature in the sawdust-manure mixture reached 24–25° C.; the manure cover was then removed and the trench covered with straw mats. The temperature was maintained throughout the 18 days of treatment.

1400. PARFENOV, T. T.
Use of electricity for "kiljčevanie" of cuttings. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 1, pp. 50-1.

At the end of January prepared vine cuttings were stratified upside down in damp sand in an aluminium cylinder. The sand was covered with a thin layer of decomposed horse manure and the container covered with a lid to which a 40 v. electric lamp was attached. The cylinder was then placed in a galvanized vessel containing some ice. The lamp burned continuously, maintaining temperatures of 25–30° C. under the lid throughout the 17–18 days of treatment. The cuttings were then planted in deep paper pots in wooden containers and placed on hot bricks near the window, the room temperature being 18–20° C. Here they came into growth. In April they were moved into a temperature of 0–2° C. and growth was suspended. Planted out at the end of May they resumed growth in early July. This treatment induced the vines to undergo 2 vegetation periods in one season, and as a result many fruited in the following season.

1401. BABARCZY, J.
Szölötermesztési kísérletek tisztán bazalt porral. (**Trials on growing vines on basalt powder.**) [Russian and Italian summaries 1 p. each.]
Agrokem. Buda., 1954, **3**: 103-12, bibl. 3, illus.

The physical and chemical characteristics of ground basalt used as a growing medium for newly germinated and 1-year-old vine seedlings and rooted rootstocks are given. All plants survived the first growing season, and when N was applied they grew normally. As a source of N, ammonium carbonate appears to be more suitable than ammonium nitrate. Plants receiving no N showed chlorotic symptoms.

1402. BRACONNIER, —.
La fumure de la vigne. (**Vine manuring.**)
Reprinted from *Rev. agric. Afr. Nord*, No. 1840, in *Terre maroc.*, 1954, **28**: 485-7.

Extracts are given from a general report on vine manuring prepared from the individual reports of member countries presented at the conference of the Office Internationale du Vin held in Paris in September, 1954. After a review of the problems involved, notes are given on practice in Algeria, Tunisia, Spain, Portugal, Switzerland and France. Treatments vary greatly.

1403. PUTJATIN, P. I.
A trial of granulated fertilizers. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 7, pp. 56-7.

Organo-mineral granules composed of FYM and NPK in a 2: 1 ratio, applied to the vine variety Aligote on Riparia × Rupestris 104–14, produced considerably higher yields than comparable rates of NPK alone in powdered or mixed powdered and granulated forms.

1404. DEPARDON, —., AND BURON, —.
Au sujet du diagnostic foliaire de la vigne. Cas particulier de la potasse. (**Vine leaf analysis with special reference to potash.**)
C.R. Acad. Agric. Fr., 1954, **40**: 652-6, bibl. 3.

Some vine growers in the Blois district have been advised to apply as much as 300 kg. potash per ha. in addition to 10,000 kg. farmyard manure, but fertilizer experiments, leaf analyses and soil studies at the Blois Agronomic Station show that this is excessive and may adversely affect the must. It is considered that, in the northern vine-growing districts of France, not more than 200 kg. potash per ha. should be applied when the K content of the leaf dry matter is about 1·25%.

1405. DELMAS, J., THEILLER, G., AND BREISCH, R.
De la dégradation des sols sous l'influence de la culture de la vigne dans le Sud-Ouest. (**On soil degradation due to vine growing in the south-west [of France].**)
C.R. Acad. Agric. Fr., 1954, **40**: 632-6.

In the Gironde, a region of moderately high rainfall, vine growing often results in soil degradation on lime-deficient, neutral-acid, silica-clay plateau soils and river-alluvial terrace soils, either gravelly throughout or with a stony horizon. The causes are excessively deep cultivation bringing the subsoil to the surface, clean weeding, inadequate manuring and lack of contour planting. Recommendations are made for soil conservation and maintenance of fertility.

1406. Panyč, N. T.
Pruning of vines in regions of champagne viticulture in Krasnodar province. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 6, pp. 33-40, illus.

Methods of pruning trellised vines subject to frost injury are discussed with special reference to provision of replacement wood. Formulae are given for calculating the number of shoots and buds necessary to produce the required yield (3 kg. per bush) on frost damaged vines.

1407. Baširov, F. B.
Hastening the production of young vineyards. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 5, pp. 19-26, bibl. 10.

A lengthy article criticizing some of the accepted methods of pruning and training young vines and describing the principles of an improved system. This consists essentially of summer pruning and pinching back of main shoots and utilizing the resultant side shoots.

1408. Konlechner, H.
Rebholz als Humusquelle. (**Vine-wood as a source of humus.**) [English, French and Spanish summaries.]
Mitt. Klosterneuburg, Ser. A, 1954, **4**: 247-51, bibl. 8.

The author discusses the use of vine-wood as fuel, fodder, and as litter for farmyard manure. Manure with such litter has a high absorptive capacity and a nutritive content somewhat higher than manure with straw as litter.

1409. Coombe, B. G.
Last season's experience with PCPA on currants.
J. Dep. Agric. S. Aust., 1954, **58**: 126-7.

In November, 1953, the extensive use of PCPA on currant vines gave satisfactory results. Berry set was equal to that obtained with cincturing, and berry growth rate was quicker, though maturity was delayed a few days. Yield and quality ranged above and below that of cinctured grapes. Leaf distortion was observed in most vines after spraying. In some irrigated areas poor results were reported from weak vines on saline soils; soil dryness was also associated with poor results to some extent. Irrigated vines were sprayed with 80–90 gal. per acre, and those in rainfall areas with 40–70 gal. per acre; in general these proved satisfactory rates. High rates of application did not seriously affect resultant crops, but vines produced few bunches in the following spring. In the rainfall areas sprayed vines showed more *Elsinoe* infection than cinctured vines. PCPA applications to Grenache, Muscat gordo and Cabernet sauvignon did not improve fruit set. Applications to sultanas at full bloom gave greatly increased berry size. Recommendations for growers are given. [For earlier report see *H.A.*, 24: 1284.]

1410. Weaver, R. J.
Effect of benzothiazol-2-oxyacetic acid on development of Black Corinth grapes.
Bot. Gaz., 1954, **115**: 365-71, bibl. 4, illus.

Further experiments on the control of size in Black Corinth grapes are described. In 1952 it was observed that benzothiazol-2-oxyacetic acid applied to clusters at flowering resulted in a high percentage of set of rather small berries. Since it was thought that the production of small berries might be of commercial interest, further trials comparing the effects of this compound with those of girdling and of 4-chlorophenoxyacetic acid were carried out in 1953 in two locations. Of the benzothiazol-2-oxyacetic acid treatments, that at 20 p.p.m. gave the largest berries, but the weight of crop and individual berries was usually only about half that of fruit from girdled vines or from vines sprayed with 4-chlorophenoxyacetic acid. The use of benzothiazol-2-oxyacetic acid usually retarded colouring. Clusters dipped in benzothiazol-2-oxyacetic acid at 20 p.p.m. at full bloom, or 4, 10, or 18 days later, all developed small berries of about the same size. Clusters were treated with benzothiazol-2-oxyacetic and 4-chlorophenoxyacetic acid, separately and combined. Combined treatment usually resulted in clusters similar to those treated only with 4-chlorophenoxyacetic acid, although some clusters contained a few small berries like those resulting from treatment with benzothiazol-2-oxyacetic acid. [From author's summary.]—Univ. Calif., Davis. [Summaries of previous experiments are given in *H.A.*, 20: 2434, 22: 2260, 23: 1603 and 23: 2732.]

1411. Tiščenko, A. I.
An attachment to the secateur for picking table grapes. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 5, p. 54, illus.

Secateurs fitted with a simple attachment cut and grip the stalks which are then released as the bunches are placed on the trays. The bloom on the grapes, which are untouched by hand, remains intact, and the rate of picking is increased by freeing the left hand to open the foliage. Illustrations are given of the tool alone, when fixed to the secateur and in operation.

1412. Tritton, S. M.
Successful wine making.
Grey Owl Res. Labs, Almondsbury, Glos., undated, 8×5½ in., pp. 36, 5s.

Directions based on personal experience for the domestic making of mead, perry, cider, fruit wines and vegetable wines.

1413. Chierego, N.
Contenuto in rame nel vino. (**Copper content of wine.**)
Riv. Vitic. Enol., 1954, **7**: 387-8.

Copper in wine is derived partly from spray residues and partly from biological sources. The copper content of wines made from 13 vine varieties, including some which require few copper treatments, ranged from 0·116 mg./l. in wine made from Seyve-Villard 12,347 to 0·493 mg./l. in wine made from Soave.

1414. Viljoen, A. S., and Bredell, C. H.
Mechanisation in the grape-packing house.
Fmg S. Afr., 1954, **29**: 561-2, 568, illus.

A packhouse system is described in which the bunches are transported by conveyor belts, in contrast to the usual method of hand transport. By this method both labour and packing costs are reduced, the packhouse is kept clear of empty boxes and discarded fruits, and there is less handling.—W.P. Fruit Res. Stat., Stellenbosch.

1415. Taylor, R. H.
Dried vine fruit production costs.
J. Dep. Agric. Vict., 1954, **52**: 540-4, illus.

Production costs in the Mid-Murray area are higher than in other dried fruit areas of the Murray Valley. One of the contributory factors is disease incidence, black spot and mould damage at harvest being the most serious problems. Of these 2 diseases mould damage at harvest, which necessitates early picking and hot dipping, has the greatest effect on the costs of production.

Nuts.

(*See also* 1183, 1281, 1282, 1284, 1365, 2078.)

1416. Gagnard, J. M.
Recherches sur les caractères systématiques et sur les phénomènes de stérilité chez les variétés d'amandiers cultivées en Algérie. **(Research on systematic characters and sterility in almond varieties grown in Algeria.)**
Ann. Inst. agric. Algér., 1954, **8** (2): 1-163, bibl. 161, illus.

The 10 almond varieties studied (Desmayo, Nec plus ultra, Avola, Fournal de Brézenaud, Marcona, Languedoc, I.X.L., Non Pareil, Drake, Texas) were all self-sterile. Eight varieties were inter-compatible in varying degrees; cross-pollination between I.X.L. and Non Pareil was not successful, but they were both compatible with other varieties. The weather during flowering appeared to affect the receptive state of the female parent. Reduced receptivity was a dominant factor in the sterility of some varieties. Avola, for instance, which gave good setting after pollination by 3 varieties in 1950, was not so receptive in 1951 and 1952 during unfavourable weather conditions, but in all 3 years Avola pollinated Marcona satisfactorily. Texas and Drake reacted well to all pollinations. The diffusion of hormones from stigma and ovary bore no relation to incompatibility; in some varieties irregularities in floral morphology contributed to reduced fertility. The author suggests that sterility is caused by the presence of multiple alleles. In self-pollination the pollen tubes grow slowly down to the ovary, but do not reach it before the end of the receptive period. In cross-pollination the growth of pollen tubes is more rapid, so that they reach the ovary while it is still receptive. In these experiments no xenia was observed, and there was no modification in the amygdalin content of fruits resulting from pollination with bitter almond. The author concludes that the almond is of hybrid origin, since varietal cross-pollinations are easy, as also are crossings with closely-related species and with peach. [For shorter version see *H.A.*, 24: 2385.]

1417. Gagnard, J. M., and Griessinger, C.
Action pollinisatrice des abeilles sur amandier. **(The pollination of almond by bees.)**
Arboric. fruit., 1954, No. 9, pp. 9-11, illus.

Based on observations on bee-pollination of almond orchards in Algeria, the following recommendations are given to ensure maximum cross-pollination: The use of 4 hives per hectare, preferably placed near a farm track to allow for easy removal; and the removal of natural vegetation and green manure crops flowering at the same time as the almond, to reduce competition.

1418. Tricaud, P.
Il faut régénérer la culture du châtaignier. **(The necessity of re-establishing sweet chestnut growing.)**
Arboric. fruit., 1955, No. 11, pp. 10-15, illus.

The author pleads for the replanting of chestnut trees, their culture having declined in this century after attack by ink disease, *Phytophthora cambivora*. Since 1946 plants of *Castanea vesca*, *C. crenata* and their hybrids have been studied at Brive, and selections made of those which are vigorous and resistant to *Phytophthora* and drought. Some good local varieties are also listed. Methods of grafting and suitable soil and climatic conditions are discussed. At present chestnut trees cover an area of only 165,000 hectares in France.

1419. Groven, I.
Orienterende sortsforsøg med hassel. **(Preliminary hazel variety trials.)**
Tidsskr. Planteavl, 1954, **58**: 240-64, bibl. 9, illus.

Trials of many hazel varieties were carried out at Spangsbjerg and Hornum during the periods 1934–1952 and 1940–1952 respectively. Data are tabulated on frost resistance, time of flowering, temperature during the flowering period, vigour, yield, nut size and percentage of kernels. The results largely agree with those summarized in an earlier report [noted in *H.A.*, 21: 300j]. The description of each variety is accompanied by a photograph of several nuts.

1420. Sharpe, R. H., and Gammon, N., Jr.
Fertilization of pecans.
A.R. Fla agric. Exp. Stats 1952/53, p. 113.

The more important effects of the treatments which began in 1949 or 1950 were: (1) Higher Ca in foliage from plots receiving gypsum than in check plots, and slightly higher than in the dolomite treated plots. (2) Trees receiving 5 lb. N per tree annually had higher N and lower P levels than trees receiving 1 lb. N. (3) K levels were higher in foliage from trees receiving 5 lb. K_2O than from those receiving 1 lb. K_2O annually. A significant N × K interaction indicates less effective increase in K content when K is combined with 5 lb. than with 1 lb. N. (4) Percentage of N in foliage showed a progressive increase in legume cover-crop plots compared with carpet grass under pasture conditions. Increase of N from the legume cover crops was more than the effect of applying 40 lb. N per acre, even though moderate pasturing was practised.

1421. Sharpe, R. H., and Blackmon, G. H.
Effect of growth regulators on production and quality of certain nut and fruit plants.
A.R. Fla agric. Exp. Stats 1952/53, pp. 113-14.

Sprays of 20 or 100 p.p.m. 2,4,5-T in mid-June effectively thinned the nut crop in the Moneymaker (but not the Moore) pecan variety, increasing individual nut weight by 10%. Sprayed trees set good crops in the following year while the controls failed to bloom. Thinning was not achieved by spraying with 330 or 670 p.p.m. maleic hydrazide.

1422. Ščepotjev, F. L., and Pobegaĭlo, A. I.
A study on the viability of black walnut (*Juglans nigra*) pollen in artificial media (*in vitro*). [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **98**: 289-91, bibl. 3.

In experiments in the Ukraine black walnut pollen germinated better on agar+glucose+boric acid than on glucose+boric acid or glucose alone. Moistening the pollen for $\frac{1}{2}$ to 1 hr before germination increased the percentage of germinating grains; moistening for 2 hrs significantly reduced it. Storage tests showed that pollen stored on ice at a fairly high humidity (room condition) remained much more viable than that stored on ice over $CaCl_2$. Pollen stored for 4 days at room temperature, either over $CaCl_2$ or at higher humidity, did not germinate.

1423. Kuppuswami, B. S.
A note on the pollination and fruit set in walnut (*Juglans* sp.).
S. Indian Hort., 1954, **2**: 153, bibl. 4.

Floral morphology and pollination effects were studied in seedling walnut trees growing at Coonoor. The length of blossoming period averaged 59 days from the third week in March. Most anthers dehisced between 10 a.m. and 12 noon, while stigmas remained receptive for almost 24 hours. The average number of nutlets per panicle was 16, of which 33% developed to harvest. There were no large differences in fruit set between panicles developing at different times, or between self- and cross-pollination. Hand pollination increased fruit set by 5%.—Agric. Res. Inst., Coimbatore.

1424. Hall, A. P., and others.
B vitamin in walnuts.
Calif. Agric., 1954, **8** (11): 15.

The results are tabulated of analyses for the 6 vitamins comprising the vitamin B complex in kernels of 3 walnut varieties harvested in 2 or more years. All 6 vitamins were consistently lower in Franquette than in Payne and Placentia.

Noted.

1425.

a Blake, R. C.
Strawberry progeny testing and evaluation of parents for breeding.
Diss. Abstr., 1954, **14**: 1892, being *Publ.* 9611 of 128 pp.

b Brooks, A. N.
Strawberry culture in Florida.
Market Grs' J., 1955, **84** (2): 18, 32.
Culture as an annual crop, varieties and packing.

c Eggenberger, W.
Erhebungen über die Verwendbarkeit verschiedener Materialien für das Binden der Rebe. **(Records on the use of several materials for tying vines.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 11-13, bibl. 3.
Wädenswil rings [clips that facilitate tying] were cheapest in labour and material. See also *H.A.*, 24: 231.

d Falch, J., and Strauss, E.
Prüfung verschiedener Ananaserdbeersorten für die Gefrierkonservierung. **(Hautbois [?] strawberry variety tests for freezing.)** [English, French and Spanish summaries $\frac{1}{4}$ p. each.]
Mitt. Klosterneuburg, Ser. B, 1954, **4**: 148-52, bibl. 2.
One year's trials with 11 varieties.

e Luque, J. A.
Biologiá y situación de labores en vid. **(Cultural operations in relation to the biological cycle of the vine.)**
Experimenta, 1954, **1** (2nd ser.) (1): 29-57, bibl. 9.
In central and southern Mendoza province, Argentina.

f Malan, A. H.
The maintenance of young table grape vineyards.
Fmg S. Afr., 1954, **29**: 493, 503.
Selection and planting, pruning and crop restriction in early years.

g Peyer, E.
Die Düngung von Reben in kalkreichen Böden. **(The manuring of vines on calcareous soils.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 67-70.

h Schwartze, C. D.
Growing strawberries in the Pacific Northwest.
Market Grs' J., 1955, **84** (1): 12-13, 37, 39, illus.
All aspects treated.

i Šupica, M., Kaljužni, G., and Kuri, F.
O vrijednosti hercegovačkih sorata vinove loze na osnovu rezultata ispitivanja šira. **(The economic value of vine varieties in Herzegovina based on results of must studies.)** [French summary 1 p.]
Arh. poljopr. Nauk., 1954, **7** (16): 87-101, bibl. 5.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 1182, 1185, 1186, 1549d, g, n, 1571-1574, 2271, 2278, 2291, 2292, 2299.)

1426. Canada, Minister of Agriculture.
Tree fruits.
A.R. Canada Minist. Agric. 1953/54, 1954, pp. 33-7.

Apple scab: successful fungicidal applications given in Nova Scotia, Quebec, Ontario and British Columbia are listed. *Blight in pear: Pseudomonas syringae* causing blossom and twig blight in pear was reported for the first time in Canada. *Virus diseases:* a new cherry variety Van was not materially affected by little cherry disease; symptom variation in several hosts suggested that little cherry was a separate virus from western X little cherry; small bitter cherry virus was considered to be the same as western X little cherry. *Codling moth:* Ryania gave excellent control in Nova Scotia, but was ineffective in British Columbia. *European red mite:* In parts of the Okanagan valley there was evidence of strain resistance to parathion and malathion. *Oriental fruit moth: Macrocentrus ancylivorus* was an important parasite of twig-infesting larvae in Ontario. In general the count of the parasite was higher than previously, indicating that DDT and parathion sprays for the moth have not had a harmful effect. *Pear psylla:* Three sprays of malathion were most effective in Ontario.

1427. Canada, Minister of Agriculture.
Small fruits.
A.R. Canada Minist. Agric. 1953/54, 1954, pp. 38-9.

Raspberry viruses: Rubus occidentalis was the most useful indicator for the *Rubus* viruses; on the basis of *R. occidentalis* symptoms 2 virus diseases were separated, namely leaf mottle and yellow mosaic. *Strawberry diseases:* strains of *Mycosphaerella fragariae* collected from Ontario, Quebec and Vermont showed differences in pathogenicity. *Strawberry pests:* Studies on the black vine weevil showed that the long preoviposition period allowed time for post-harvest control of the adults before egg-laying. Such control was not possible with strawberry root weevil, which lays eggs before the fruit is harvested. *Blueberry pests:* blueberry maggot was effectively controlled by calcium arsenate as a dust, but the foliage was burned; sprays of bordeaux and calcium arsenate gave somewhat poorer control but no leaf scorching.

1428. Fremouw, C. A.
De bestrijding van ziekten en plagen bij fruit onder glas. (**Pest and disease control on fruit under glass.**)
Meded. PlZiekt. Dienst **107**, revised 1954, pp. 40, illus.

The author deals with the most important pests and diseases, including nutritional and physiological disorders, of grapes, peaches and plums. Disease symptoms and control measures are summarized. The various methods of application are described, spray materials are surveyed, and precautions for the use of poisonous sprays enumerated.

1429. Wenzl, H.
Wunden und Wundbehandlung. (**Wounds and wound treatment.**)
Pflanzenarzt, Wien, 1953, **6** (6): 7.

Advice for avoiding damage to fruit trees is given, including care in and timing of pruning and thinning. Treatment of pruning wounds, frost and pest damage, twig cankers, and large wounds is outlined.

Diseases of nutritional, physiological or unknown origin.

(*See also* 1242, 1243, 1337, 1386, 1549b, 2305.)

1430. Bould, C.
Chelated iron compounds for the correction of lime-induced chlorosis in fruit.
Nature, 1955, **175**: 90-1, bibl. 6.
A control for lime-induced chlorosis.
Grower, 1955, **43**: 377-9, illus.

Experiments on the use of iron chelates for the correction of lime-induced chlorosis in fruit trees growing in highly calcareous soils (pH 7·8) were continued at control of chlorosis. With the exception of Fe-EDTA, applied in solution around the trees at the rate of 8 oz. per tree and thoroughly watered in, completely controlled chlorosis and resulted in vigorous extension growth. This is the first recorded response to soil treatments by fruit trees in Great Britain. *Plums:* Soil treatments were unsuccessful, but this may have been due to the failure of the iron chelates to penetrate to the roots. Foliage sprays of several chelated iron compounds plus wetter, applied at petal fall and twice subsequently at fortnightly intervals, gave commercial control of chlorosis. With the exception of Fe-EDTA which produced a little marginal and tip scorch, the treatments did not cause any spray damage. *Peaches:* Extremely chlorotic trees were practically cured by a single foliage application on 29 June of 0·1% ferric diethylenetriamine-pentaacetate plus a wetting agent. The success of soil dressings appears to depend on the use of sufficient iron chelate and on its transport to the roots by rain or heavy watering. In the case of plums and peaches the cost of foliage sprays is lower than that of soil applications, but pear leaves are more difficult to wet and they are damaged more easily. The full results of these and further experiments will be reported elsewhere.—Long Ashton Res. Stat.

1431. Mazanašvili, G. K.
Chlorosis resistance of rootstock varieties of vine in Georgia. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 1, pp. 22-5.

Grafted vines are more subject to chlorosis than direct producers or rootstocks. Data are given on the chlorosis resistance of various rootstocks and of 3 scion varieties grafted on the same rootstocks. From these the author concludes that on soils containing more than 10% lime at a depth of 80–100 cm. Berlandieri × Riparia 420-A, 5-BB and Chasselas × Berlandieri 41-B should be used. These, in addition to chlorosis resistance, possess resistance to frost and drought and are long-lived. More specific local recommendations of suitable rootstocks are also made.

1432. Rui, D., Ciferri, R., and Scaramuzzi, G.
La leptonecrosi del pesco. (**Peach leptonecrosis.**)
Ital. agric., 1954, **91**: 773-9, illus.

The external and internal symptoms of peach leptonecrosis in adult and young plants are described, and an account is given of experiments made in 1950/53 to determine the cause of the disorder. While the exact cause remains doubtful the addition of fertilizers has proved successful. The recommended treatment is 240 g. 48–50% sulphate of potash, 500 g. 18–20% superphosphate and 200 g. 20–21% sulphate of ammonia mixed with 30–40 kg. farmyard manure per adult tree, dug in as deeply as possible under the branch-spread of the tree in February, followed by 50–60 g. calcium nitrate applied on the surface in a similar position in mid-March and again in mid-April.

1433. Woodbridge, C. G.
Zinc deficiency in fruit trees in the Okanagan Valley in British Columbia.
Canad. J. agric. Sci., 1954, **34**: 545-51, bibl. 14, illus.

In the Okanagan Valley of British Columbia a zinc deficiency was found to occur on apple, pear, cherry, peach, apricot, and prune fruit trees. The severity of the deficiency varied considerably from orchard to orchard. In some the severity was very marked and death of some tissues had occurred. In others the deficiency was moderate and some or all of the characteristic symptoms usually associated with it, viz. small leaves, leaf rosettes, and an interveinal chlorotic pattern, were present. When the deficiency was slight, one or more of these symptoms were recognizable only at certain times of the growing season. With the exception of cherry, affected trees responded well to zinc sulphate sprays when applied during the late dormant period. Summer sprays of zinc oxide and the injection of various zinc compounds into the trunks of affected trees were less effective. A good correlation between the zinc content of tissues and the presence of deficiency symptoms was established. [Author's abstract.]—Canada Dep. Agric., Summerland, B.C.

1434. Posnette, A. F., and Cropley, R.
Strawberry yellows in the variety Auchincruive Climax.
J. hort. Sci., 1955, **30**: 56-61, bibl. 2, illus.

The characteristics of transient yellows and streak of Auchincruive Climax are described. These abnormalities are regarded as genetical; there is evidence that they are not graft-transmissible, and they seem to occur spontaneously in insect-proof glasshouses. The development of transient yellows and streak in four subclones (strains) of Auchincruive Climax is described. Yellows developed a year later in the strain which had not been propagated intensively than in those which had undergone unlimited runner production for five years. Transient yellows in the autumn was invariably followed by streak in the following spring; streak sometimes developed on plants which had not previously shown transient yellows. Vigour and cropping were greatly reduced by streak. There was evidence that transient yellows alone reduced vigour, but no data were available regarding its effect on crop. [Authors' summary.]—E. Malling Res. Stat.

1435. Kostjuk, P. N., Mišurenko, A. G., and Šterenberg, P. M.
On causes of spotted necrosis. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 7, pp. 46-50, bibl. 1, illus.

Susceptible and partially resistant vine varieties are listed. Contrary to earlier suggestions fluctuating temperatures alone were not found to be responsible for spotted necrosis of grafts developing mainly during the dormant period. The cause remains unknown, but the possibility of a connexion between grey mould (*Botrytis cinerea*) and spotted necrosis is entertained. For control of grey mould spraying of established bushes with 1% solution of soft soap 2 weeks before harvest and later destruction of infected wood are recommended. As preventive treatment against necrosis suitable methods of storage are described for transplants and shoots respectively.

1436. Eifert, J.
A szőlőoltványok barnafoltosságáról és az azt előidéző oxidáló enzimrendszerek szerepéről. (**On the brown spotted necrosis of vine grafts and the role of oxidizing enzyme systems responsible for it.**) [English, French and Russian summaries.]
Agrokem. Buda., 1953, **2**: 209-22, bibl. 15, illus.

Evidence is presented showing that brown spotted necrosis of vine grafts and cuttings is not an infectious disease, but is caused by oxidation of the tyrosinase (polyphenoloxidase) enzyme system in the presence of air. The brown gummy substances, quinones, formed in the process appear in the existing tissues after cutting or grafting and are not found in tissues formed during subsequent development. Browning decreases with distance from the cut surface. Certain conditions such as high temperature (optimal range 35–40° C.) and weak union encourage the development of necrosis. Trials on the control of the phenomenon with substances inhibiting browning *in vitro* (*p*-nitrophenol, thiourea and ascorbic acid) are in progress, but complete control is not considered either possible or desirable, since the quinones have healing and antiseptic properties. Brown spotted necrosis causes serious damage only in immature wood generally unsuitable for propagation.

1437. Farmer, A.
Hollow end. An abnormality of plum fruits.
Orchard. N.Z., 1954, **27** (11): 2, illus.

An abnormality in fruits of Santa Rosa plum is reported from New Zealand. Externally there is a lateral restriction towards the apical end. Internally a cavity is found in the flesh at the tip of the stone, and the stone is broken or distorted. The cause is unknown.

Climatic factors.

(*See also* 1278, 1288, 1289, 1295, 1406, 1643, 1650, 1893, 1894, 1990h, 2265, 2266, 2308.)

1438. Akabane, N., Sagizaka, S., and Yamazaki, T.
Frost injury to apple trees. I. Resistance of buds and twigs to low temperatures. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1954, **23**: 97-102, bibl. 8, illus.

Frost resistance in buds and 1-year-old twigs of mature Jonathan and Ralls Janet apple trees was investigated. In cortical cells the value of the critical concentration for plasmolysis was highest in December/February and then gradually decreased. Buds on twigs cut in January and February survived exposure to temperatures of −20 to −25° C., but in twigs cut in February the longer the freezing period the lower was the percentage which grew out. On the twigs in which cortical cells survived after freezing not all the buds grew out. In cortical cells of winter twigs, the longer the time taken for "dehardening" [acclimatizing to higher temperatures), the lower was the cell permeability to water. The deplasmolysis time of cells dehardened for 6 days was 5 times that of hardy cells. In the process of freezing living cells, intra-cellular freezing as well as extracellular freezing was observed. In the latter case, none of the cells was usually killed by freezing. Intracellular freezing, however, was always fatal. The mechanism of trunk splitting due to frost is discussed briefly. [From authors' summary.]

1439. Stoll, K.
Witterungsbedingte Abnormitäten an Äpfeln. **(Abnormal development of apples due to weather conditions.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 487-91, illus.

Several non-parasitic disorders of apple fruits, such as glassiness, spotting and excessive spray damage frequently observed in Swiss orchards in the autumn of 1954, are attributed to abnormal weather conditions during the summer: deformed corky fruits, on the other hand, may be due to boron deficiency. The symptoms of each disorder are described and illustrated.—Wädenswil.

1440. Bömeke, H.
Über das Röteln (Pocken) bei Kirschen. **(Fruit drop in cherries.)**
Mitt. ObstVersuchsringes Jork, 1954, **9**: 211-12.

Observations on fruit drop of cherries in the Alte Land in 1950–1953 suggest the following conclusions: (1) The trouble is a varietal characteristic, possibly connected with the development of the root system. (2) Cold weather during flowering may affect pollination by bees. (3) A temperature of 0° C. during fruit set may kill the young embryos. (4) Lack of nutrient supplies, whether due to drought or other causes, increases fruit drop as a result of embryo starvation.

1441. Rui, D., and Romanelli, O.
La difesa antigrandine in Italia nella decorsa annata. **(Hail control in Italy in 1953.)**
Agric. Venezie, 1954, **8**: 775-96, illus.

Eighty-one hail control projects were conducted (compared with 61 in 1952) over 490,000 ha. (419,000) in 22 provinces (22), nearly 57,750 rockets (47,000) being fired from just under 8,000 sites. Of the 73 projects costed, 48 cost less than 1,000 lires per ha., 16 cost between 1,000 and 3,000 l., and 9 exceeded 3,000 l. Facts and figures are given on the campaign in general and in each commune. It is desirable that rockets should have a height-range of 1,500 m. and that each firing site should be equipped with at least 2 firing tubes, preferably remote-controlled. [For results in previous years see *H.A.*, 23: 3987, 3988.]

1442. Eidg. Volkswirtschaftsdepartement, Bern.
Grossversuch II zur Bekämpfung des Hagels auf der Magadinoebene. 1. Versuchsjahr. Tätigkeitsbericht Nr. 6 1953. **(Sixth annual report on the large-scale trials on the prevention of hail storms in the Magadino plain [Switzerland] for 1953; 1st year of trial II)**, 1954, pp. 46, maps.

After 5 years of large-scale but unsuccessful attempts to use rockets for the dispersion of hail storms in the Magadino plain* experiments with cloud seeding were begun in 1953, the seeding agent (AgI) being generated as mist on the ground. There were few hail storms in 1953 and with these no success could be recorded. The trials are to be continued for an indefinite period. [For previous trials see *H.A.*, 19: 1911, 23: 389, 3989.]

1443. Bovay, E.
Détection des dépots de fluor et de chlore sur la végétation aux alentours des usines de produits chimiques. **(The determination of fluorine and chlorine deposits on foliage in the vicinity of chemical factories.)** [German, Italian and English summaries.]
Landw. Jb. Schweiz, 1954, **3** (n.s.): 959-74, bibl. 17, illus.

Apricot trees showed scorching on young leaves when the concentration of F was about 3–10 mg. per 100 g. of dry matter. Apple and pear trees were less sensitive to F, while vines were more so. No injury due to Cl alone was observed although high concentrations have been detected. The F content of leaves varied with the weather, increasing in dry weather and decreasing greatly during rain. Cl tended to accumulate in the leaves.—Lausanne. [For abstract of shorter paper see *H.A.*, 25: 290.]

Viruses.

(*See also* 1549a.)

1444. Goidanich, G., Govi, G., and Branzanti, E. C.
Le virosi delle piante da frutto in Emilia e Romagna. **(Fruit tree virus diseases in Emilia and Romagna.)**
Ital. agric., 1954, **91**: 603-16, bibl. 19, illus.

The fruit trees virus diseases observed in Emilia and Romagna are peach rosette, peach ring-spot, almond mosaic, apple mosaic, apple plastomania and fig mosaic. Notes are given on symptoms and varietal susceptibility.

1445. Fridlund, P. R.
Studies on virus diseases infecting hardy *Prunus* grown in Minnesota nurseries.
Diss. Abstr., 1954, **14**: 1862, being *Publ.* 10026 of 131 pp.

The study was mainly on latent necrotic ring spot virus using *Prunus tomentosa* as an indicator. The symptoms of the virus in this host were shoot dieback, mottling, necrotic spotting, leaf reddening and general stunting. Cultures were shown to vary in infectivity and symptom production in *P. tomentosa* and 6 other species. Comparisons were made of differences in symptom expression and frequency in potted *P. tomentosa* seedlings, a clone propagated by cuttings, and a clone budded on *P. americana* roots. Results indicated that the individual response of plants to transplanting may be more important in causing symptom diversity than genetic differences. High constant temperature (30° C.) produced symptoms more rapidly than a lower temperature (18° C.), and it increased the severity of shoot dieback and mottle symptoms. Low temperature increased the severity of necrotic spotting. Different pruning methods had little influence on symptom severity. Eighteen hardy hybrid *Prunus* varieties of a wide range of specific parentage were found to be susceptible to latent necrotic ring spot virus, but the symptoms were indistinct. Little natural infection was found in Minnesota nurseries, and surveys of wild *Prunus* in the State showed only 4·5% infection. [See also *H.A.*, 25: 297.]

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* The final report is to be published shortly.

1446. Jordović, M.
Običan mozaik na nekim sortama šljiva. Prethodno saopštenje. **(Plum mosaic on some plum varieties. Preliminary communication.)** [English summary 6 lines.]
Zasht. Bilja, 1954, No. 25, pp. 73-5, bibl. 3.

Of 80 plum varieties observed at the Institute of Fruit Production, Čačak, in 1953, 14 were found to be severely infected with plum mosaic, 11 moderately and 7 mildly. On 48 varieties no infection was noted. The symptoms, here briefly described, occurred on the leaves only.

1447. Perišić, M. M.
Šarka šljive u srezovima radjevskom (Krupanj) i jadranskom (Loznica). **(The plum virus disease "šarka" (plum pox, *Prunus* virus 7) in the districts of Krupanj and Loznica.)** [French summary 1 p.]
Zasht. Bilja, 1954, No. 24, pp. 98-103, bibl. 2.

Observations conducted in July, 1953, showed that plum pox occurs mainly on the variety Požegača, particularly when raised from suckers. The disease is transmitted through vegetative propagation; it does not appear to be spread by aphid vectors.

1448. Capretti, C.
Alterazione di probabile natura virosica nel susino e nel cotogno. **(Virus-like abnormalities in plum and quince.)** [English summary 3 lines.]
Riv. Ortoflorofruttic. ital., 1954, **37**: 442-6, bibl. 8, illus.

In 1954 the author observed in 2 6-year-old Shiro plum trees near Florence a mosaic-like chlorosis affecting the veins of the leaves but leaving greater or smaller areas of normal colour between the veins. The symptoms resembled those of line pattern mosaic. Some 30 3-year-old quince trees growing nearby showed interveinal chlorosis.—Ist. Pat. for. agrar. Univ. Firenze.

1449. Diener, T. O., and Dekker, C. A.
Isolation and identification of L-pipecolic acid from western-X diseased peach leaves.
Phytopathology, 1954, **44**: 643-5, bibl. 12.

Paper chromatographic analysis of free amino acids in peach leaves affected with western-X disease and systemic arsenic toxicity revealed an unidentified, ninhydrin-reacting substance which could not be detected in extracts prepared from mature, healthy leaves. The ninhydrin-reacting substance was isolated from western-X diseased peach leaves by the use of column chromatographic methods and identified as L-pipecolic acid. [Authors' summary.]—Univ. Calif., Berkeley.

1450. Millikan, D. F., Jr.
Studies of the ringspot virus complex in sweet cherry.
Diss. Abstr., 1954, **14**: 1901, being *Publ.* 9192 of 151 pp.

Inoculation studies showed that sweet cherry varieties could be grouped according to their sensitivity to infection. One group, including Lambert and Napoleon, was very sensitive to ringspot virus, showing necrosis varying from death of a few spurs to death of the entire varietal tissue. The less sensitive group, including Gold and Hardy Giant, showed chlorotic spotting sometimes leading to necrosis. Regional isolates differed from each other no more than isolates from the same region. Inoculation with strains from different hosts resulted in similar symptoms. The latent virus group did not appear to be very closely related to necrotic ringspot strains and did not confer protection against the more virulent strains. Growth studies made over a 3-year period showed that a factor significantly reducing growth of 1-year-old nursery trees was present in cherry stocks from unindexed sources and trees artificially infected with ringspot virus. This inhibition was restricted to the middle of the growing season. Tests on diseased and disease-free leaves indicated that there was approximately 50% more ribose nucleic acid in ringspot infected leaves than in healthy leaves. Differences in the nucleic acid content between various strains of the virus used in the study could not be detected.

1451. Mulder, D.
De overbrenging van een virusziekte van zure kers op komkommer. **(The transmission of a virus disease of sour cherry to cucumber.)** [English summary 7 lines.]
Tijdschr. PlZiekt., 1954, **60**: 265-6, bibl. 2, illus.

Sap from young cherry leaves, showing shock effect of a virus infection (probably necrotic ringspot), was rubbed onto the cotyledons of cucumber seedlings. The cucumbers became infected and showed necrosis of the growing point, yellow spots on the leaves and rosette formation.—I.P.O., Wageningen.

1452. Bovey, R.
Guérison de fraisiers, atteints de virus, par traitement thermique. **(Curing virus-infected strawberry plants by heat treatment.)** [German, Italian and English summaries.]
Landw. Jb. Schweiz, 1954, **3** (n.s.): 1041-7, bibl. 15, illus.

The method of heat treatment for virus inactivation used at Lausanne is described. Symptoms of crinkle and yellow-edge on Mme Moutot, as well as the appearance of a healthy plant, are outlined. [See also *H.A.*, 24: 3601.]

1453. Goheen, A. C.
Methods for determining the success of graft unions between plants in strawberry virus studies.
Plant Dis. Reptr, 1955, **39**: 31-2, bibl. 4, illus.

The need for repeating virus indexing tests on strawberry plants runner-grafted to *Fragaria vesca*, because it is uncertain whether a graft union has occurred, can be obviated by severing the daughter plant from the mother plant and removing its roots and some leaves about 4 days before checking the plants for virus transmission. A similar procedure can be adopted in cases where stolon-leaf petiole grafts are used.—Hort. Crops Res. Branch, U.S. Dep. Agric., Beltsville.

1454. Stanković, D., and Bećarević, A.
Promene metabolizma fosfora u organima nekih vrsta voćaka izazvane fitopatogenim virusima i parazitnim gljivicama. (**Changes in the phosphorus metabolism of some fruit trees caused by virus and fungus diseases determined by P^{32} as tracer.**) [English summary 9 lines.]
Zasht. Bilja, 1954, No. 26, pp. 3-8, bibl. 15.

Taphrina deformans on peach, *Clasterosporium carpophilum* on cherry and *Venturia inaequalis* on apple increased phosphorus metabolism in the leaves and reduced it in the wood and bark. Mosaic virus on Italian prune increased P metabolism in all organs except fruit.

Bacteria.

1455. Dye, D. W., and Dye, M. H.
Blast of stone fruit . . . and its control.
Orchard. N.Z., 1954, **27** (10): 13-17, bibl. 4.

Streptomycin applied at 100 p.p.m. in water as a foliage spray to peach trees has given very good protection against blast of stone fruit (*Pseudomonas syringae*). The authors suggest application at bud movement and leaf fall when the bacteria are most active. Obvious cankers and dead wood should also be cut out. [See also *H.A.*, 24: 3664.]

1456. Dye, D. W.
Preliminary field trials to control blast of stone fruit (*Pseudomonas syringae* van Hall.)
N.Z. J. Sci. Tech., Sect. A, 1954, **36**: 331-4, bibl. 2, illus.

In field trials carried out in mid-winter, late winter just prior to bud movement, and 8 days later when bud movement had started, peach seedlings were wounded, sprayed with therapeutants and, when dry, inoculated with *P. syringae*. Streptomycin sulphate at a concentration equivalent to 180 p.p.m. streptomycin base gave a high degree of protection in all trials. Bordeaux mixture, 6-8-100, and Flit 406 (50% N trichloromethylthiotetrahydrophthalimide [captan]) at 2 lb. per 100 gal. reduced infection slightly in 2 trials. Dithane Z 78 at 3 lb. per 100 gal. gave inconclusive results. A larger number of lesions developed in the third trial than in the second, which suggests that peach seedlings may become more susceptible to attack when spring growth begins.

1457. Kirby, R. S., and Bauer, A. H.
Prevention of fire blight on pears and apples.
Circ. Pa agric. Ext. Serv. **436**, 1954, pp. 8, illus.

Recognition, cause and spread of *Erwinia amylovora* in Pennsylvanian orchards are dealt with. Susceptible and fairly resistant varieties of apples and pears are listed. Control is largely preventive. Trials have shown that antibiotics are very effective in preventing fire blight and render the flowers almost immune for 5–7 days. Streptomycin at 100 p.p.m. is recommended for all pear sprays, and for the first apple spray in severe cases or when only 1 spray is applied. For other apple sprays 50 p.p.m. are sufficient. The inclusion of 2 lb. ferbam in 100 gal. of streptomycin spray reduced its antibiotic activity.

Fungi.

(*See also* 1356, 1409, 1435, 1454, 1484, 1549j, o, t, u, v, w.)

1458. Smith, L. C.
Apple scab investigations, 1951-1954.
J. Dep. Agric. S. Aust., 1954, **58**: 32-6, bibl. 2, illus.

Automatic spore traps in 3 areas of South Australia showed that the ascospore discharge of scab fungus occurred between late August and March, the greatest activity being in the period September to November. The size and frequency of ascospore discharge was greatest in the wetter districts, and frequency depended on rainfall during the discharge period. Amended recommendations are given for the control of apple scab in South Australia, based on results from the previous 3 seasons' work.

1459. Hutton, K. E.
Eradication of *Venturia inaequalis* (Cooke) Wint.
Nature, 1954, **174**: 1017-18, bibl. 5.

In late autumn (May), 1953, in New South Wales, sprays of phenyl mercuric chloride (0·3%), sodium pentachlorophenate (0·5%), and sodium dinitro-*o*-cresylate (0·5%) were applied to Delicious apple trees heavily infected with scab. Samples of leaves from sprayed and unsprayed trees were collected and overwintered under orchard conditions. Weekly examinations showed that perithecia were abundant on unsprayed leaves, and that on these ascospore discharge started in late September and continued until the end of January. There were no mature perithecia on leaves sprayed with phenyl mercuric chloride, and no ascospores were discharged during the test period (October–December). Sodium dinitro-*o*-cresylate considerably reduced the number of effective perithecia. On leaves sprayed with sodium pentachlorophenate many perithecia developed, and these were more mature than those on the control leaves; ascospore discharge reached a peak in October but was less than that of the controls.—Dep. Agric., Sydney.

1460. Cinq-Mars, L., and Crête, R.
Essais comparatifs de fongicides pour la répression de la tavelure du pommier. (**Comparative trials of fungicides for the control of apple scab.**)
A.R. Quebec Soc. Prot. Plants 1952, 1953, pp. 51-4.

Sulphur, ferric dimethyldithiocarbamate (ferbam), and heptadecylglyoxalidine (Crag 341-C and Crag 341-SC) were compared in tests on the control of scab on an unspecified variety of apple at Rougement, Quebec, in 1951. Tables show the percentages of leaf and fruit infection and of russeting. Ferbam gave the best results, namely 2·03% leaf infection, 3·43% fruit infection and 14·3% russeting, and was especially effective against late scab. The glyoxalidines gave better control on leaves than on fruit.

1461. La Plante, A. A.
The influence of parathion on the control of apple scab and upon fruit yield.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 78-81.

Trials in commercial orchards in N.Y. State have indicated that the use of parathion may have two serious disadvantages. (1) There is a considerable danger of decreasing the effectiveness of fungicides used for apple scab control if parathion is applied near the time of a severe scab infection period; moreover, if a considerable amount of primary infection has occurred. the use of parathion might result in a marked increase in scab infection throughout the season. (2) The use of parathion may reduce yields. In 3 McIntosh orchards an average reduction of 15% in the fruit set per 100 spurs was recorded, and in 2 Cortland orchards an average reduction of 9%.

1462. Cinq-Mars, L., Crête, R., and Maltais, J. B.
Influence de certains acides amines sur le développement de *Venturia inaequalis* (Cke.) Wint. *in vitro*. **(Effect of some amino acids on the growth of *Venturia inaequalis in vitro*.)**
A.R. Quebec Soc. Prot. Plants 1952, pp. 55-7.

In tests to determine the cause of the variation between apple varieties in resistance to scab, *Venturia inaequalis* was cultured in the presence of 20 different amino acids, including aspartic acid, alanine, arginine and glutamine. The fungus grew equally well in the presence and absence of the amino acids.

1463. Siebs, E.
Untersuchungen über die Schorfresistenz von Birnen (II). Blattschorfresistenzprüfung an Sortennachkommenschaften. **(Studies on the scab resistance of pears (II). Testing the resistance to leaf scab in the progeny of varieties.)**
Phytopath. Z., 1954, **22**: 437-48, bibl. 4.

The paper is a progress report on the testing of selected pear seedlings for resistance to scab. [See also *H.A.*, 22: 1370.]—Max-Planck-Inst. f. Züchtungsforsch. (Erwin-Baur-Inst.), Voldagsen.

1464. Jenkins, P. T.
The control of summer spot of pears.
J. Dep. Agric. Vict., 1954, **52**: 567-9, 572, bibl. 1, illus.

Tests were carried out during 1949–53 to determine the effectiveness of various organic fungicides for the control of the summer spot stage of pear scab on the bordeaux-sensitive variety Packham's Triumph without causing russeting. In the preliminary trial 9 fungicides were compared as cover sprays following 2 pre-blossom sprays of bordeaux 15: 15: 100. Only phenyl mercuric chloride, thiram, ziram and copper 8 hydroxy quinoline were comparable with bordeaux 1: 1: 50 for scab control; the bordeaux spray caused a mild russet but the other sprays caused none. The following season these 4 organic fungicides were compared with bordeaux 3: 3: 50. The bordeaux spray gave the best scab control but caused severe russeting. The order of effectiveness of the organics was phenyl mercuric chloride > ziram > thiram > copper 8 hydroxy quinoline; none blemished the fruit but phenyl mercuric chloride caused a leaf mottle. During the 1952–53 season cover sprays of thiram, ziram, phenyl mercuric chloride and phenyl mercury fixtan all gave as good control as bordeaux 1: 1: 50 without causing russeting, but both mercurial sprays caused leaf mottle and so cannot yet be recommended.

1465. Wright, T. R., and Smith, E.
Relation of bruising and other factors to blue mold decay of Delicious apples.
Circ. U.S. Dep. Agric. **935**, 1954, pp. 15, bibl. 14.

Studies were made on the relationship between bruising of harvested apples and their susceptibility to blue mould infection (*Penicillium expansum*). Firmness in the fruits decreased with advancing maturity and bruising damage was directly related to firmness. Mature apples were more susceptible to bruising and to fungus invasion of the damaged tissue than immature fruits. When inoculation of bruised fruits was delayed until 3 or more days after storage started, there was a marked reduction in fruit susceptibility to the fungus. No relationship was found between fruit maturity and rate of decay enlargement. The most favourable conditions for decay infection were when wet apples were handled roughly. The development of decay in bruised tissue was retarded when apples were rapidly cooled after harvest and subsequently stored at 31°–32° F.

1466. Soenen, A., and Busschots, A.
La pourriture du collet sur arbres fruitiers. **(Collar rot of fruit trees.)**
Fruit belge, 1954, **22**: 167-70.

Collar rot (*Phytophthora cactorum*) has appeared sporadically in Belgian orchards, particularly on Cox's Orange Pippin and Ellison's Orange. The symptoms of both trunk and fruit attack are described. Observations showed that whereas trees of all ages are liable to attack, Cox was more susceptible to attack on IX than on XIII. Summer irrigation created favourable conditions for disease development. Control is mainly preventive, namely no high N fertilization and avoidance of trunk wounds. Copper, dyes and Kankerdood applied through the growing season were used in preventive tests, so far inconclusively. Curative control is obtained by cutting out diseased bark and painting the trunk with a 2% solution of copper oxychloride.

1467. Northcote, G. S.
Phytophthora rot of apple trees.
Orchard. N.Z., 1954, **27** (10): 19.

Collar rot (*Phytophthora cactorum*) is of serious economic importance in Nelson, where Cox's Orange

Pippin is mainly affected. Control measures recommended are spring sprays of bordeaux to the trunks, grassing down, mulching, avoiding root and trunk injury, and, where only a small portion of the bark is infected, cutting away diseased tissue and painting with bordeaux paste. In new Cox plantings it is recommended that an intermediate stock should be used, so that Cox wood is well above ground level. After removal of a diseased tree the ground should be left for a year, deeply dug and fumigated before replanting.

1468. Hervert, V.
Nové poznatky v biologli padlí jabloňového (Podosphaera leucotricha [Ell. et Ev.] Salm.) a možnosti jejich praktického využití. **(New data on the biology of apple mildew and the possibilities of their practical utilization.)** [Russian and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Ser. A, 1954, **27**: 305-20, bibl. 32, illus.

The mycelium of *Podosphaera leucotricha* overwintering on the twigs has no primary importance for spring infection, and the removal of these infected shoots during the dormant season is of less value for control than was earlier assumed. The buds, in which the mycelium overwinters and which are the main source of spring infection, occur not only on infected but also on healthy shoots. It was found that the parasitic fungus *Cicinnobolus* sp. can, under certain conditions, prevent the appearance of apple mildew, and the possibility of artificial dissemination of this parasite for mildew control is being studied.

1469. Miller, P. R.
Eradicant sprays for pecan scab control.
Agric. Chemls, 1954, **9** (12): 60-1.

In a preliminary test in Oklahoma in 1953 on eradicants for the control of pecan scab, *Cladosporium effusum*, 3 eradicants were sprayed on trees of the very susceptible Squirrel variety, and on the ground within a radius of 15 feet, at 50 gal. per tree just before budburst in March. During the growing season 5 applications of 2 lb. ziram per 100 gal. were made. The best results were achieved by 80% monocalcium arsenite, namely 21% area scabbed on mature fruit at the end of the season (September) compared with 48% in the control.

1470. Vaughan, E. K., Roberts, A. N., and Mellenthin, W. M.
The influence of Douglas fir sawdust and certain fertilizer elements on the incidence of red-stele disease of strawberry.
Phytopathology, 1954, **44**: 601-3, bibl. 3.

Douglas-fir sawdust, used as a mulch, caused a significant increase in the incidence of red-stele of strawberry, caused by *Phytophthora fragariae* Hickman. Similar amounts of sawdust incorporated with the soil caused only a slight increase in incidence of the disease. The increased development of red-stele in mulched soils was apparently brought about by a decrease in soil temperature and an increase in the moisture content of the soil, and was not influenced by the utilization of nitrogen by bacteria in the decomposition of sawdust. Excessive nitrogen fertilization also increased the incidence of red-stele infections. In 4 years of testing, applications in excess of 100 lb. actual nitrogen per acre per year resulted in increased percentages of diseased plants. Phosphorus and potash did not affect red-stele development. [Authors' summary.]

1471. Stalder, L.
Botrytis-Schäden an Rebholz. **(*Botrytis* injury to vine wood.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 45-9, bibl. 4, illus.

A discoloration of the wood of most vine shoots formed in 1954 in the Wädenswil area was shown to be due to the presence of *Botrytis* mycelium and sclerotia. Such a widespread infection of the wood has not been observed before, even in bad *Botrytis* years. A mild November and December following a wet summer are thought to have been particularly favourable to the fungus. Growers are warned to select healthy scion wood.

1472. Turian, G., and Staehelin, M.
Nouvelles recherches sur le champignon du coître de la vigne (*Coniella diplodiella* [Speg.] Pet. et Syd.). **(New findings on the white rot fungus of vines, *Coniella diplodiella*.)** [German, Italian and English summaries ⅓ p. each.]
Landw. Jb. Schweiz, 1954, **3** (n.s.): 987-97, bibl. 11, illus.

Oxyquinoline and derivatives of phthalimide and thiuram (TMTD) were very active in laboratory tests against white rot fungus, but had little curative effect on damaged grapes. A quantitative method for isolating the fungus from the soil is described, very numerous spores having been found in vineyard soils. In soil sterilization experiments TMTD gave efficient control of the fungus.—Lausanne.

1473. Turian, G., and Leyvraz, H.
Une nouvelle arme chimique contre le coître (*Coniella*) de la vigne. **(A new chemical method of controlling vine white rot, *Coniothyrium diplodiella*.)**
Rev. romande Agric. Vitic., 1954, **10**: 97-8, bibl. 2.

Preventive control by destruction of the pathogen in the soil. In experiments at Pully in 1954, tetra-methyl thiuram disulphide (TMTD) dust applied on the soil surface at the beginning of August gave good disinfection to a depth of about 5 cm., thus reducing contamination by rebounding soil particles of grapes injured by hail. Grape infection rates at nil, 200 and 400 kg. TMTD per ha. were 45, 17 and 0% respectively. *Curative treatment of fruit clusters not more than 12–14 hours after a hailstorm.* At Lavaux in 1954 0·5% orthocide applied 6–13 hours after a hail storm gave an average of 73% uninfected bunches compared with 28–58% with other products. Treatment must be applied before the spores germinate. This is the new method mentioned in the title. [See also *H.A.*, 24: 2479.]

1474. Chamberlain, G. C.
The dead-arm disease of the grape vine in the Niagara Peninsula.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 116-22, illus.

Dead-arm [caused by *Cryptosporella viticola*] is one of the most serious diseases of vines in the Niagara Peninsula of Ontario. There are 2 phases of the disease: (1) infections on the current season's growth, and (2) necrotic lesions in the trunk or arms which lead to death. For control of the first phase preliminary spray experiments have given very promising results. The spray programme recommended is (1) a delayed dormant application of either lime-sulphur 1-10 or 0·5% DN 289 as an eradicative measure, and (2) bordeaux 5-5-100 applied at the 2–3 leaf stage as a protectant measure. It is essential that the protective spray should be directed to the highly susceptible sucker growth at the base of the vines, or, better still, that this growth should be removed unless required for replacement stems. For control of the second phase early removal and destruction of infected vines or parts of vines is important. Inspection for dead-arm should be made early in the season, not later than the bloom period. Whether pruning of infected parts should be carried out as soon as symptoms are detected or whether it should be delayed until winter is a controversial point. It is advisable to select renewal stems from those originating below ground. Since infection gains entrance through prominent pruning stubs, cuts should be made close to supporting wood. No advantage has been found in the use of wound dressings, but pruning tools should be disinfected.—Lab. Plant Path., St. Catharines, Ont.

1475. Coombe, B. G.
Control of black spot of sultanas. Report of 1953-54 trial.
J. Dep. Agric. S. Aust., 1954, **58**: 29-31, illus.

Good control of *Elsinoe ampelina* was obtained by spraying TMTD or ziram at 1½ lb./100 gal. at bud swell and 2 weeks later at bud burst. A single spray at bud swell of TMTD at 3 to 4 lb./100 gal. is recommended for controlling mild attacks.

1476. Smith, W. P. C., Harvey, H. L., and Jamieson, W. R.
Black spot (anthracnose) of grapes. Further experiments with new fungicides.
J. Agric. W. Aust., 1954, **3**: 433-9, bibl. 1, illus.

Black spot (*Elsinoe ampelina*) was successfully controlled on sultana grapes by a spray programme using ziram, thiram or captan. Applications recommended were 1 dormant, 2 pre-blossom, and 1 or 2 post-blossom sprays, using 3 lb./100 gal. for the dormant sprays and 1½ lb./100 gal. subsequently.

1477. Boubals, D., Vergnes, A., and Bobo, H.
Essais de fongicides organiques dans la lutte contre le mildiou de la vigne effectués en 1954. **(Tests with organic fungicides against vine downy mildew in 1954.)**
Progr. agric. vitic., 1955, **143**: 64-74, bibl. 6.

In tests at the INRA viticultural laboratory at the National School of Agriculture, Montpellier, in 1954 previous results [see *H.A.*, 23: 2834 and 24: 3623] were confirmed thus, 0·5% captan proved better than 0·6% zineb, and zineb plus copper oxychloride or copper sulphate gave as good fruit protection as 2% bordeaux.

1478. Delp, C. J.
Effect of temperature and humidity on the grape powdery mildew fungus.
Phytopathology, 1954, **44**: 615-26, bibl. 39, illus.

A controlled-atmosphere wind tunnel was used to study the effects of temperature and humidity on *Uncinula necator*. The results obtained help to explain the occurrence and natural control of powdery mildew in different parts of California. High temperature is the primary limiting factor and in interior valleys where such temperatures occur over long periods powdery mildew is rarely a serious problem.—Univ. Calif., Davis.

1479. Gambarjan, G. S.
Spraying vines with colloidal sulphur against oidium. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 5, pp. 31-3.

In Armenia colloidal sulphur had a longer residual action and afforded better protection of vines against powdery mildew [*Uncinula necator*] than sulphur dust. Complete control was obtained with 2 to 3 applications. Colloidal sulphur was found to be compatible with bordeaux mixture used against downy mildew [*Plasmopara viticola*], it improved the latter's residual action, and where necessary their combined application is recommended.

Nematodes.

1480. Colbran, R. C.
Problems in tree replacement. II. The effect of certain methods of management on the nematode fauna of an orchard soil.
J. Aust. Inst. agric. Sci., 1954, **20**: 234-7, bibl. 5.

The root-lesion nematode *Pratylenchus coffeae* Zimmerman remained infestive in cans of moist soil free of plant growth for 8 months. The population of *P. coffeae* in field plots from which infested apple trees had been removed was maintained at a high level when the area was cropped with tomatoes or allowed to revert to a volunteer vegetation which contained *Rumex acetosella* L. as a dominant species. In a field experiment sawdust mulching for 9 months to suppress plant growth resulted in a considerable reduction of the soil population of *P. coffeae*, *Paratylenchus macrophallus* (deMan) Goodey and *Trichodorus* sp. [Author's summary. For Part I see *H.A.*, 24: 1368.]—C.S.I.R.O., Stanthorpe, Qd.

1481. Meijneke, C. A. R., and Oostenbrink, M.
Bodemmoeheid in boomkwekerij en fruitteelt. **(Soil sickness in tree nurseries and orchards.)**
Fruitteelt, 1955, **45**: 172-3, illus.

Symptoms of soil sickness are often caused by free-living nematodes, of which *Pratylenchus* species are the most common in the Netherlands. Young apple and cherry rootstocks made much better growth in old orchard soil heated to 60° C. or fumigated with DD than in untreated soil.

1482. Raski, D. J.
Control of nematodes on grapes.
Calif. Agric., 1955, **9** (1): 9-10, 15, illus.

Nematodes, notably *Meloidogyne incognita* var. *acrita* and less frequently *M. javanica* and *Pratylenchus vulnus*, are probably one of the most important factors in the premature decline of vineyards in California. Soil fumigation with D-D, EDB and other fumigants following the removal of old vines and preceding the planting of new ones has not given consistent results in reducing nematodes in 5 areas, though in most cases the growth of the young vines in the early stages was much better than that of the controls. The best results were obtained in an area where 3 years had elapsed between grubbing and replanting, although bean crops planted during this period had resulted in a large build-up of nematodes. In the other cases only a short period had elapsed between grubbing and replanting, and it is suggested that nematodes in the root fragments of old vines probably survived fumigation at the doses used. It is concluded that a crop rotation programme terminated by soil fumigation may be essential to ensure adequate, long-term control.

Mites.

1483. Dosse, G.
Über Bekämpfungsmöglichkeiten einiger Spinnmilbenarten mit verschiedenen Akariziden. **(On the control of several spider mite species by various acaricides.)**
Reprinted from *Anz. Schädlingsk.*, 1954, **27**: 65-71, bibl. 13.

In the region of the Agricultural College Stuttgart-Hohenheim, where these experiments were carried out, *Eotetranychus telarius*, *Amphitetranychus crataegi* and *Brevipalpus* (*Tenuipalpus*) *oudemansi* have become important pests of apple in addition to *Metatetranychus ulmi* and *Bryobia praetiosa*. It is therefore necessary to find acaricides that are effective against different developmental stages of different species infesting the trees at the same time. None of the proven and experimental compounds tested in these trials can be said to have the wide range of action required. The tabulated data include results against *Tetranychus urticae* (on carnation and bean) which so far has been only a minor pest of apple in the area.

1484. Smith, L. C.
Concentrate airblast spray trials.
J. Dep. Agric. S. Aust., 1954, **58**: 23-6, bibl. 2, illus.

Two main trials were carried out in the 1953–54 season, one on mite control and one to obtain more accurate information on spray concentrations for airblast sprayers. Concentrate spray machines of the turbo-mist type effectively applied dormant and semi-dormant sprays for the control of *Bryobia* mite on Jonathan apples. There was no significant difference in scab control by a bordeaux, lime-sulphur schedule applied by concentrate sprayer at ¾ and ½ the normal rates, when compared with control by the full rate; further work is necessary as the season was not a bad one for scab. Interim recommendations are given for the use of concentrate airblast sprays in orchards under South Australian conditions.

1485. Smith, L. C.
Control of bryobia mite—recent investigations and recommendations.
J. Dep. Agric. S. Aust., 1954, **58**: 27-8.

Experimental work on apples during the 1953–54 season showed that ovotran (parachlorophenyl parachlorobenzene sulphonate) and PCPBS (parachlorophenyl benzene sulphonate) gave successful control of *Bryobia praetiosa*. The materials acted as persistent ovicides, and controlled the summer build-up of the mite when applied as 2 sprays 3 weeks apart, starting during late November or early December. Applications after mid-January are likely to cause fruit damage. HETP or parathion combined with either material provided a single spray control for *Bryobia*. Late summer control was obtained by 2 sprays of HETP or parathion applied 12 to 14 days apart. A summer oil applied once did not satisfactorily control *Bryobia* under the conditions of this experiment. PCPBS, ovotran, HETP and parathion could all be applied by a concentrate airblast sprayer at 4 times concentration used for dilute, hand spray application.

1486. Böhm, H.
Untersuchungen über die Biologie und Bekämpfung der Roten Stachelbeermilbe (*Bryobia praetiosa* Koch.). **(The biology and control of gooseberry red spider mite.)** [English summary ¾ p.]
PflSch. Ber. Wien, 1954, **13**: 161-76, bibl. 12.

Studies on the biology and control of *Bryobia praetiosa* were carried out in Austria. Laboratory and field studies showed no morphological differences between mites from different hosts, but there were differences in the life-cycle. On apple 4 generations were observed, on *Hedera* 2 generations, while on gooseberry there was 1 generation per year. It was not possible to transfer mites from one host to another, which suggests differentiation into biological races. Systemic insecticides gave very good control of the mite. Parathion and lime-sulphur gave good control when applied after the larvae had hatched, or before oviposition in the summer. After oviposition had started, only a systemic insecticide spray after flowering gave control. Winter spraying with DNC or mineral-oil gave some control, but was not satisfactory without summer spraying.

1487. Unterstenhöfer, G.
Outdoor tests with "Systox" to control the fruit-tree spider mite, *Paratetranychus pilosus* Can. et Fanz.
Höfchen Briefe (English edition), 1954, **7**: 67-78, bibl. 9.

Two years' field tests on bush apple trees showed that a single application of Systox (0·05%) will give economic control of the fruit tree red spider. Optimum protection of the trees resulted from timing the treatment to coincide with the pink bud stage.

1488. Wilcox, J., and Howland, A. F.
Comparison of demeton dusts and sprays on beans and strawberries.
J. econ. Ent., 1954, **47**: 945-6.

For the control of 2-spotted spider mite, *Tetranychus bimaculatus*, and western flower thrips, *Frankliniella moultoni*, on lima beans and the same mite on strawberries, sprays were better than dusts. Against the strawberry aphid, *Capitophorus fragaefolii*, on strawberries, sprays and dusts were equally effective.

1489. Anthon, E. W.
Peach silver mite control.
J. econ. Ent., 1954, **47**: 866-8, bibl. 2.

In 1952 and 1953 a dormant and delayed dormant spray of lime-sulphur, or oil and lime-sulphur combinations failed to give season-long control of peach silver mite, *Vasates cornutus*, in north central Washington. In 1952, 4 acaricides applied in July gave very good control for 1 month. In 1953, wettable sulphur at 3 lb. per 100 gal., systox at ½ pt, chlorobenzilate at 1 pt or ½ pt and compound 876 at 1 lb. gave significant reductions of mite population.

Insects.

(*See also* 1232, 1296, 1549i, k, l, p, q, x, y.)

1490. QUEBEC SOCIETY FOR THE PROTECTION OF PLANTS.
Official list of the French names of insects of economic importance in Canada.
Publ. Dep. Agric. Quebec, 2nd edit., 1952, pp. 73.

Irrespective of whether you are scientist, exclusively French speaking or exclusively English speaking, if you want to find a Canadian insect this is the place to look. Every name is listed, alphabetically. A most useful piece of documentation.

1491. NEW SOUTH WALES DEPARTMENT OF AGRICULTURE.
Insect pest survey for the year ending 30th June, 1953, 1954, pp. 44.

Including fruit and vegetable pests, and those of ornamental plants and lawns.

1492. POST, A.
Oecologische onderzoekingen in boomgaarden. Invloed van cultuurmaatregelen. **(Ecological research in orchards. The influence of cultural practices.)**
Tijdschr. PlZiekt., 1954, **60**: 281-7, bibl. 10.

In Zeeland surveys of neglected and well-kept orchards have been made to compare their fauna. The health of trees in well-kept orchards was better than in neglected orchards, and this factor as well as the spray programme has an important influence on the species present. Red spider (*Metatetranychus ulmi*) was more important in well-kept orchards than gooseberry mite (*Bryobia praetiosa*), but was comparatively unimportant in neglected orchards where *Bryobia* appeared in greater numbers. The author suggests that red spider mite may feed more easily on the less leathery leaves of well-tended trees, but this requires further investigation. It was shown that predatory mites, which were numerous in neglected orchards, preferred red spider to brown mites, while other predatory species attacked both mites. Some preliminary work has been done on the effect of cultural practices on orchard fauna. Sprays for killing moss on trees reduced predatory hemipterous species, apple blossom weevil, *Typhlocyba* sp. and *Psylla mali*. In both sprayed and unsprayed plots *Tortrix* spp. were found in large numbers, and there was a build-up of red spider in late summer, particularly on Bellefleur. There was an indication that the total numbers of *Bryobia* adults and eggs were lower on unsprayed and unpruned plots than on unsprayed, but pruned and cultivated plots. Very few woolly aphids were found in the completely neglected plot.

1493. GARMAN, P.
Spray combination for control of apple pests in Connecticut.
J. econ. Ent., 1954, **47**: 731-4.

In 1952 8 insecticide-fungicide spray combinations were applied to McIntosh apple trees, and in 1953 7 similar treatments were given to the same trees. The effects of these treatments were noted on some 12 pests and on fruit appearance and quality. In 1953, to which most of the data refer, a DDT-parathion-Phygon (early)-ferbam (late) combination produced the cleanest fruit but also fruit of the poorest flavour. Lead arsenate-captan-Glyodin, which was less satisfactory for pest control, gave the best quality fruit. It appears that the most effective spray combinations caused some foliage injury, which in turn reduced fruit quality.

1494. CHABOUSSOU, F.
La lutte contre les insectes du pêcher. **(Control of peach pests.)**
Arboric. fruit., 1954, No. 9, pp. 12-13, 15-16, 19-20, bibl. 18, illus.

The relative importance of and control measures for insect pests of peach in France and the U.S.A. are compared.

1495. SMITH, E. H.
Control of quince pests.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 63-5, illus.

Recent experiments have shown that parathion may be substituted for DDT in the control of oriental fruit moth on quince. The minimum number of sprays required for control of this major pest, however, would not provide protection against red-banded leaf roller, plum curculio or quince curculio.

1496. MADSEN, H. F., AND DETAR, J. E.
Leaf curl plum aphid control.
Calif. Agric., 1955, **9** (1): 8, 13, illus.

Anuraphis [*Brachycaudus*] *helichrysi*, long present in California, suddenly assumed economic importance in 1953. Experiments have shown that effective control can be obtained by dormant or delayed dormant applications of dinitro compounds or by cluster bud applications of parathion, malathion or oil-nicotine. Petal fall applications of these latter materials proved too late to be effective.

1497. WARTENBERG, H.
Histologische Studien über Blutlausgallen, Blutlausabwehrnekrosen, Parenchymholzbinden und Markflecke bei Malussorten. **(Histological studies on galls, protective necrosis, ray flecks and bands of parenchymatous tissue occurring in *Malus* species as a reaction to woolly aphid attack.)**
Reprinted from *Wiss. Z. Friedrich-Schiller-Univ. Jena*, 1953/54, 3: 409-30, bibl. 38, illus.

A detailed description is given of the histological abnormalities formed in apple shoots in reaction to woolly aphid attack. Resistant species react with a protective necrosis, whereas typical woolly aphid galls are formed in the susceptible species. Many intermediate stages of abnormal development are also described. Amongst others, ray flecks, continuous bands of parenchymatous tissue in the wood, and hard galls consisting of lignified parenchyma superimposed on the woody cylinder are regarded as reactions of semi-resistant *Malus* species. The author concludes that cambial cells adjoining the xylem are more susceptible to both the gall-forming and necrotic effects of woolly aphids than those adjoining the phloem. The anatomical details of the stylet track are described in detail. The author considers that the aphid does not supply auxin which initiates gall formation, but that it affects the hormone balance of the host and thereby inhibits differentiation at a time when the plant itself is growing actively and its auxin content is high. Unless typical galls are formed, the aphid is unable to multiply and to form effective colonies. B.G.M.

1498. Kloft, W.
Über Einwirkungen des Saugaktes von *Myzus padellus* HRL. & Rogers (*Aphidinae*, *Mycini* CB.) auf den Wasserhaushalt von *Prunus Padus* L. Vorläufige Mitteilung. **(Effects of the sucking action of *Myzus padellus* on the water balance of *Prunus padus*. Preliminary communication.)**
Phytopath. Z., 1954, **22**: 454-8, bibl. 7.

Aphids were placed on the leaves of cut bird cherry shoots and the effect of sucking on water uptake and water loss was measured. The changes in the water balance recorded are due to the absorption of liquid by the aphids as well as to the toxic action of the saliva injected into the cells.—Univ. Würzburg and Eidg. Tech. Hochschule, Zürich.

1499. Gersdorf, E.
Beiträge zur holozyklischen Überwinterung von *Myzodes persicae* Sulzer im Bereich des Pflanzenschutzamtes Hannover im Winterhalbjahr 1953/54. **(The holocyclic overwintering of *Myzodes persicae* in the Hanover area during the winter months of 1953/54.)**
Z. PflKrankh., 1955, **62**: 1-11, bibl. 13.

Myzodes persicae was found to overwinter on the following *Prunus* spp. besides peach: *P. serotina*, *P. nana* and *P. serrulata*. Of these only the first-named may be of some economic importance as a winter host of the aphid. [See also 1549x.]

1500. Loladze, V. R.
A study of phylloxera resistance in Georgian vine varieties. [Russian.]
Sad i Ogorod, 1954, No. 12, pp. 60-1.

Crossing European varieties with American vines gave unsatisfactory results, but selections of 3 European varieties showed promise and these are now used in breeding for phylloxera resistance.

1501. Frézal, P., and Portelli, R.
Action du captan sur le phylloxera gallicole de la vigne. **(The action of captan on the gall-forming phylloxera of vine.)**
C.R. Acad. Agric. Fr., 1954, **40**: 563-6.

Experiments in Algeria in 1953 indicated that captan, used as a fungicide on several hybrid direct producer varieties of vine, greatly reduced the intensity of an attack by the gall-forming *Phylloxera vitifolii*. Further experiments in 1954 were carried out to evaluate the effect of a normal spray schedule for downy mildew on the population of gall-forming phylloxera. Six weeks after spraying with 0·25% captan, the number of galls averaged only 1 or 2 per leaf, and the pest was mostly concentrated at the shoot tips, thus hardly interfering with normal growth of the vines. On vines treated with zineb or bordeaux mixture there was an average of 5–10 galls per leaf.

1502. Giordani, G.
Le api, le frutta e l'uva. **(Bees, fruit and grapes.)**
Apicolt. d'Ital., 1953, **20** (2): 27-9, from abstr. in *Bee World*, 1955, **36**, No. 10/55.

This paper shows that bees are incapable of damaging smooth-skinned fruit, although they will suck the juice of fruit previously damaged by birds, wasps or other insects. A certain early fig, with a crinkly porous skin, is the only fruit which they are able to damage.

1503. Dean, R. W.
Apple insects—plum curculio.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 75-7.

Reasons for the recent increase in curculio damage on apples are discussed. Lead arsenate is losing its effectiveness in control of this insect, as also, in some cases, is DDT-lead arsenate mixture. In such cases methoxychlor or dieldrin are recommended.

1504. Smit, B.
The C.M.R. beetle.
Fmg S. Afr., 1954, **29**: 579-80, illus.

The C.M.R. beetle (*Mylabris oculata*) can cause serious damage to crops of apples and beans by feeding on the flowers. Satisfactory control may be obtained by dusting with 5% DDT, 5% malathion or 2% parathion dusts.

1505. Taschenberg, E. F.
Recent outbreaks of grapevine flea beetle.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 133-6, illus.

The biology, sources of infestation and control of this pest are dealt with. Wild or neglected vines within ½ mile of cultivated vineyards should be destroyed. Wettable DDT sprays, at 2 lb. in 100 gal., have given good control provided they are applied as soon as the beetles appear.—N.Y. St. agric. Exp. Stat., Geneva.

1506. Appanna, M., and Maheswariah, B. M.
The grape flea beetle, *Scelodonta strigicollis* Mots., and its control.
Mysore agric. J., 1954, **30**: 106-11, bibl. 7, illus.

DDT plus BHC has given good control of *Scelodonta strigicollis* in small-scale trials in Mysore.

1507. Kloft, W.
Über Lebensweise und Schadauftreten des zottigen Blütenkäfers *Tropinota hirta* Poda sowie seine Bekämpfung mit Toxaphen. **(Biology and noxious incidence of *Tropinota hirta* and its control with toxaphene.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 113-15, bibl. 8, illus.

In 1953 *Tropinota hirta* continued to cause serious damage to the blossom of fruit trees in certain areas of

Germany (see also *H.A.*, 23: 1714). Blossom applications of toxaphene at high concentrations (emulsion: 0·5%, suspension: 0·7%, and dust: 15–20 kg. hectare) achieved satisfactory control of the pest without injury to bees visiting the trees. Other host plants in the orchard also require treatment, and varieties blooming later than the rest must be treated separately. An incidental finding of these trials was that toxaphene controls *Argyresthia ephipiella* on cherries in addition to *Tropinota hirta*.—Würzburg Univ.

1508. Richardson, H. P., and Allen, W. R.
Notes on the life history, habits, and control of the apple seed chalcid, *Torymus druparum* Boh. (Hymenoptera: chalcididae).
Eighty-fourth A.R. ent. Soc. Ont., 1953, pp. 76-9, bibl. 1.

The adults of the apple seed chalcid cause considerable loss in seed of new apple and crab apple seed varieties being developed for the prairie regions of Canada. Adults emerge in mid-June. In southern Manitoba the pest can be controlled by application of DDT at ¾ lb. per 100 gal. water at the time of emergence.

1509. Lienk, S. E.
Cherry pest problems under investigation.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 70-4.

On the basis of trials at Geneva, methoxychlor is recommended as a substitute for lead arsenate in the control of fruit fly and curculio on Morello cherries, as the latter spray tends to cause dry-stem injury. For Montmorency cherries, which are less susceptible to dry-stem, lead arsenate is still recommended. Fruit sprayed with lead arsenate was slightly smaller and had a significantly higher soluble solids content than fruit sprayed with methoxychlor.

1510. Lagaude, V.
Observations concernant la mouche de la cerise et les moyens de la combattre. **(Observations on the cherry fruit fly and methods of control.)**
C.R. Acad. Agric. Fr., 1954, **40**: 683-9.

During 1954 the activity and control of cherry fruit fly (*Rhagoletis cerasi*) was studied in orchards in the Rhône valley. From the beginning of May until mid-June, adults were captured daily; counts were low or zero on rainy days and during the mistral. Trees were sprayed between the 20 and 22 May and again on the 1 or 2 June. Emulsions of DDT alone or with lindane were used and excellent results were obtained, with no deleterious effect on taste or appearance of the fruit. Control of the fly is difficult in mixed orchards of early and late varieties, the latter being the more seriously attacked. In some of the treated orchards the mite *Amphitetranychus viennensis* began to build up at the end of July.

1511. Wädenswil.
Untersuchungen über Biologie und Bekämpfung der Kirschenfliege. **(Research on the biology and control of the cherry fruit fly.)**
Landw. Jb. Schweiz, 1954, 3 (n.s.): 610-11.

Trials with some new plant protective materials have been made against cherry fruit fly. Dieldrin applied about 3 weeks before harvesting gave tainted fruit. Parathion gave good control but further trials are necessary. Diazinon could be used instead of parathion, and is less toxic to man.—Wädenswil.

1512. di Rosa, M.
Contro la *Rhagoletis cerasi*; lotta riuscita nell'Avellinese. **(Control of *Rhagoletis cerasi* in the province of Avellino.)**
Ital. agric., 1954, **91**: 787-97, bibl. 2, illus.

In large-scale experiments on the control of *Rhagoletis cerasi* on the cherry varieties Tenta, Donna Luisa, Piedicorta, Imperiale and Corvina in the province of Avellino in 1954, 2 treatments were normally given, namely DDT plus parathion plus wetter on the appearance of the adults in late May, and parathion plus wetter in late May or early June. The average infection rates of fruit samples taken subsequently were nil to 18% compared with 55 to 62% in the controls. Residues were such as to present no danger to consumers. Costs are given. Conclusions were that for medium-late varieties a single application of 30% DDT plus 20% parathion plus wetter is sufficient, but that for late varieties 2–3 applications should be made, the last omitting DDT.

1513. Prešern, T.
Suzbijanje muhe trešnjarice u Slovenskom primorju. **(Control of cherry fruit fly on the Slovenian seaboard.)** [German summary ½ p.]
Zasht. Bilja, 1954, No. 24, pp. 79-86, bibl. 6.

Notes are given on losses caused to the cherry industry by the cherry fruit fly, *Rhagoletis cerasi*. Control with DDT under existing conditions was unsatisfactory, but combined DDT-parathion preparations showed good promise. In 1953, 18,500 cherry trees were sprayed with 0·2% Gesarol 50+0·05% Fosferno 20. The treatment was made 2–3 weeks before harvest and gave satisfactory results.

1514. Delmas, H.-G.
Quelques problèmes pratiques soulevés par l'expérimentation de traitements contre *Ceratitis capitata* (Wied.) en Roussillon. **(Some practical problems met with in experiments in Roussillon on the control of *Ceratitis capitata*.)**
Fruits d'Outre Mer, 1954, **9**: 436-42, bibl. 1.

The following subjects are discussed in the light of experiments on the control of *Ceratitis capitata* in peach orchards in Roussillon in 1950/53: choice of variety (preferably a late, heavily attacked variety, fully freestone to facilitate examination); experimental design; timing and application of treatment; meteorological records; observing the results; sampling, harvesting and examination of the fruit; statistical analysis of the results.

1515. Gavrieli, M.
Control of the fruit fly in peaches at Givat-Chaim. [Hebrew.]
Hassadeh, 1954, **35**: 195-7.

Successful control of fruit fly [*Ceratitis capitata?*] in peaches was achieved by spraying in 1953 with methoxychlor (50%) at a concentration of 0·75%, and in 1954 with DDT (50%) at 0·3%, a spreader being used on both occasions. The timing of the first spray application is of great importance especially with late varieties, and may be determined directly by observing the stage of maturity of the fruit and indirectly by comparison with observations on the time elapsing between flowering and maturity in previous years. To minimize the number of sprays needed early varieties should be grown separately from late ones. Where trees are grown singly it is necessary to spray surrounding plants which may act as hosts for the fly. H.C.R.

1516. Tominić, A.
Biološka ispitavanja muha *Carpomyia vesuviana* A. Costa. (**Biological investigations on *Carpomyia vesuviana* A (Diptera) Costa.**) [English summary ¾ p.]
Zasht. Bilja, 1954, No. 24, pp. 92-7, bibl. 1.

The jujube, *Zizyphus sativa*, is resistant to drought and to most insect pests, and grows well in Dalmatia, but lately its ripening fruits have been attacked by *Carpomyia vesuviana*. The biology of the fruit fly is described, and results of laboratory control trials with phosphoric acid ester, BHC and DDT preparations are given. Gesarol 50 at 0·4% concentration was the most effective of the insecticides used, and was also found satisfactory in orchard tests. It is thought likely that 2 spray applications of a DDT preparation will give economic control.

1517. Glass, E. H.
The codling moth.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 82-8.

The indications that codling moth may be developing resistance to DDT are discussed, and the effectiveness of other insecticides for its control are reported on.

1518. de Jong, D. J., and van de Pol, P. H.
Het gebruik van vanglampen voor het vaststellen van de vluchten van het fruitmotje en van de bladrollers. (**The use of light traps to determine the flight of codling moth and leaf rollers.**)
Fruitteelt, 1955, **45**: 200-2, illus.

Traplights were used throughout the Netherlands to capture moths of *Enarmonia pomonella* [codling moth] and *Adoxophyes orana*. In 1954 phenological differences were few. On the basis of codling moths captured it was shown that 96% were captured when the temperature in the evening twilight was above 13° C., the critical evening temperature for egg-laying being 15° C.

1519. Hamilton, D. W., Summerland, S. A., and Fahey, J. E.
Codling moth control experiments, 1950-53.
J. econ. Ent., 1954, **47**: 768-75, bibl. 3.

In Indiana laboratory tests of DDT against 3 strains of codling moth larvae did not indicate that any of them developed resistance. Weather favourable for codling moth activity, inadequate coverage with low-gallonage sprays and possible reduction in DDT deposits due to spray combinations used may have, however, led to increased injury in 1952 and 1953 over that in 1950 and 1951. Results of tests with many organic insecticides by the field-laboratory method supplemented by field trials have shown DDT, parathion, EPN, Diazinon, Metacide, CS-708, methyoxychlor and ryania to be the most effective against codling moth. In field trials a DDT-parathion combination gave the best control.

1520. Dean, F. P., and Newcomer, E. J.
Methoxychlor for codling moth control.
J. econ. Ent., 1954, **47**: 936-7, bibl. 1.

Methoxychlor, 50% w.p., was compared with DDT over 4 seasons at Yakima, Washington, for control of codling moth on apples. The material applied with an acaricide, usually parathion, was more effective than similar applications of DDT. It was also found compatible with many other acaricides.

1521. Wädenswil.
Bekämpfung des Apfelwicklers. (**Codling moth control.**)
Landw. Jb. Schweiz, 1954, **3** (n.s.): 602-4.

Eggs of the codling moth are generally laid when the temperature is 15–16° C. Two relatively late sprays, in mid-July and mid-August in Switzerland, reduced the number of fruits attacked by the pest. Diazinon reduced the fruit fall from 30% to 7%, and parathion from 39% to 7%.—Wädenswil.

1522. Osburn, M. R.
EPN for control of the hickory shuckworm on pecan.
J. econ. Ent., 1954, **47**: 931, bibl. 1.

Near Albany, Georgia, 3 applications of 2 lb. of 25% EPN in 100 gal. gave the biggest reduction of infestation by shuckworm, *Laspeyresia caryana*. This treatment also produced the largest and best quality nuts. Infestations of the black pecan aphid, *Melanocallis caryaefoliae*, and of the mite, *Tetranychus hicoriae*, developed on untreated trees to a greater extent than on the trees sprayed with EPN.

1523. Smith, E. H., and Avens, A. W.
The ovicidal action of parathion in control of the peach tree borer.
J. econ. Ent., 1954, **47**: 912-17, bibl. 6, illus.

Investigations made on the distribution of the eggs of peach tree borer [*Sanninoidea exitiosa*] on the trunks of 5- and 20-year-old peach and 15-year-old prune trees showed that over 70% of the eggs were deposited within 6 in. of the soil level. Parathion bark residues were found to be higher initially and to weather more slowly than leaf residues. A single spray provided residual effectiveness for more than 13 days, and exposures of 2 to 6 days were required to cause mortality of eggs deposited on the sprayed surface.—N.Y. St. agric. Exp. Stat., Geneva.

1524. Mailloux, M.
La tordeuse à bandes rouges (*Argyrotaenia velutinana* Walker). (**The red-banded leaf-roller.**)
Rev. d'Oka, 1954, **28**: 113-22, bibl. 39.

The author discusses the control of red-banded leafroller in relation to conditions in Quebec. Of all control methods, insecticides are the most efficient and practicable. The larval stage is the most susceptible, but good coverage is essential as the pest feeds on the lower leaf surface. Varied experience over several years has shown that DDD is the best commercial insecticide; it is effective against both generations, and all larval stages; its residual effect lasts for 3 weeks. Parathion is not recommended for control in Quebec. Malathion is promising and is recommended against the second generation. Spraying may be done twice during the year, against the first generation at 8–10 days after petal-fall, and against the second about 5 August.

1525. Dexter, P. M.
The control of light brown apple moth (*Tortrix postvittana*) of canning peaches with dichlorodiphenyl dichloroethane (D.D.D.).
J. Aust. Inst. agric. Sci., 1954, **20**: 182-4, bibl. 3.

The use of DDT for oriental fruit moth has possibly caused the recent increase in light brown apple moth infestations in the Goulburn Valley. Lead arsenate sprays cannot be used for apple moth control on peaches without risk of severe defoliation. In a trial on Pullar cling peaches excellent control of the pest was given by DDD at 0·1%. Endrin also gave promising control, but lindane and dieldrin were ineffective.

1526. Zagaĭnyĭ, S. A., and Jurčenko, P. D.
***Phassus schamyl*—a vine pest.** [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 1, pp. 25-7, bibl. 1, illus.

P. schamyl occurs only in the Caucasus, mainly in forests. The caterpillars were found to damage the roots, root collar and lower stems of vines. For control 12% BHC at 30 g. per bush applied to exposed upper roots and lower part of the stem was reported to be effective.

1527. Nagy, B.
Ökologiai magfigyelések és védekezési kísérletek a poloskaszagú almadarázzsal (*Hoplocampa testudinea* Klg.) kapcsolatban. **(Ecological observations and experiments on the control of the apple sawfly (*Hoplocampa testudinea* Klug.)**
Növénytermelés, 1954, **3**: 229-44, bibl. 38, illus.

A description of the biology of the sawfly and the damage it causes is followed by a review of literature on its control and an account of the author's preliminary trials. Six apple trees, variety Entz's Rosemary, and 10 trees, variety Red Astrachan, were sprayed 3–5 days after petal fall with 2% Agritox (containing 2·1% γ-BHC). The treatment reduced the number of sawfly-damaged fruits by 83–84% compared with the controls, but owing to low infestation it did not result in an increased yield.

1528. Avidov, Z., and Swirski, E.
Occurrence of the plum sawfly (*Hoplocampa flava* L.) in Israel and its control.
Bull. Res. Coun. Israel, 1954, **4**: 199-201, bibl. 3.

DDT, methoxychlor, parathion, quassia and Agrocide all gave satisfactory control of the plum sawfly, but for commercial use Agrocide is recommended as most suitable. Agrocide 3 dust and 0·3% wettable powder were both effective and did not cause tainting of the fruit. They were, however, injurious to bees.—Agric. Res. Stat., Rehovot.

1529. Sidor, Ć.
Proučavanje šljivinih osa u Vojvodini. **(Results of studies on plum sawfly in Vojvodina.)** [German summary 2¼ pp.]
Zasht. Bilja, 1954, No. 26, pp. 43-56, bibl. 6.

For control of *Hoplocampa minuta* and *H. flava* on plums, 1% solution of DDT (16·5%) or 0·5% Gamexan (Bentox 20%) added to 1% bordeaux mixture and 0·1% parathion (Phospherno 20) in water gave satisfactory results.

1530. Stępniewska, K.
Owocnica żołtoroga (*Hoplocampa minuta* Christ. = *H. fulvicornis* Thomson) i jej zwalczanie. **(*Hoplocampa minuta* Christ. and its control.)**
Roczn. Nauk rol., Ser. A, 1954, **68**: 681-3.

Spraying at petal fall with 0·4% Azotox M^{25} at 8 litres per tree gave satisfactory sawfly control on plums.

Other pests.

1531. Hase, A.
Schäden an Walnüssen durch Eichhorn und Specht. **(Walnut damage by squirrels and woodpeckers.)**
Reprinted from *Anz. Schädlingsk.*, 1953, **26**: 121-4, bibl. 9, illus.

Some bird and rodent injury to walnuts is described. Crows have been observed pecking the green skins of unripe nuts so that the whole fruit falls to the ground. The hanging of a stuffed crow in the treetop so that it was moved by the wind was successful in scaring off birds. Squirrels open the nuts, leaving little external damage but scattering empty half-shells. Other damage observed was a hole in the shell apex, with much of the nut eaten away. It is thought that this was done by woodpeckers. The harvest loss from these pests on a tree in Dahlem is estimated as about 12%.

1532. Horsfall, F., Jr.
Pine mouse control.
Amer. Fruit Gr, 1954, **74** (11): 10, illus.

Ground sprays of parathion and various organic chlorine compounds were used in pine mouse [*Microtus pinetorum*] control experiments in orchards at the Virginia Polytechnic Institute. Parathion had a downward repellent action which caused the mice to live underground and was thus dangerous to the trees. Endrin did not have this repellent action and gave the best control. High rates of endrin are required and precautionary measures must be taken by the workers. Information is given on the trail systems of the mice, to assist adequate ground coverage.

Antibiotics.

(*See also* 1209, 1549c, e, s.)

1533. Garber, J. D., and others.
Laboratory and field studies of agricultural streptomycin.
Agric. Chemls, 1954, **9** (12): 32-4.

Brief mention is made of the different horticultural uses of streptomycin, its generally greater efficacy than other antibiotics so far tested, the soluble and insoluble forms in which it is available and their different uses, its compatibility with all except the more reactive insecticides, the apparent absence of residues under normal circumstances, its absorption and persistence in leaves, and the lack of evidence of the development of resistant strains of bacteria.

Insecticides and fungicides.

(*See also* 1549f, h, 1652, 1727, 1873, 1874, 1887f.)

1534. Thiem, H.
Vergleichende Untersuchungen über die Brauchbarkeit von Winterspritzmitteln im Obstbau. **(Comparative research on the use of winter spray materials in fruitgrowing.)**
Gartenbauwiss., 1954, **1** (n.s.): 239-72, bibl. 13.

Many years' tests have been made in Germany with German products on mineral oils, tar oils and DNC preparations as winter sprays for fruit trees. As a result suitable concentrations have been determined for the control of San José scale (*Aspidiotus perniciosus*), brown scale (*Eulecanium corni*) and winter moth (*Cheimatobia brumata*). No comparable results have been obtained as regards red spider (*Paratetranychus pilosus*). In general the concentration of effective materials against San José scale is 4%, against brown scale 2% and against winter moth 1%. Mineral oils were generally more active than tar oils. Mixtures of DNC and a tar oil had an effect equal to the sum of their separate actions, DNC plus a mineral oil was more effective than each alone, but a mixture of mineral oil with a tar oil was less active than each separately.

1535. Tietz, H.
The ^{32}P marked diethyl thionophosphoric ester of β-oxyethyl thioethylether (active ingredient of the systemic insecticide "systox"), its absorption and translocation in plants.
Höfchen-Briefe (English Edition), 1954, **7**: 1-55, bibl. 102, illus.

E 1059, the active ingredient of the systemic insecticide Systox, was marked by the incorporation of radioactive P, and its behaviour followed when applied to roots and leaves for absorption. Quantities well below those of insecticidal efficiency were detected by a Geiger-Muller counter. Plants used were *Vicia faba*, *Salix viminalis*, *Pelargonium zonale*, *Cyclamen persicum*, *Cypripedium harrisianum*, *Humulus lupulus*, *Mahonia aquifolium*, *Malus sylvestris*, *Phaseolus vulgaris*, *Pyrus communis*, *Primula obconica*, *Rhoeo discolor* and *Tropaeolum majus*. E 1059 was freely absorbed from a solution by the intact root; absorption from sand and humus-containing soils was slower, and continued up to a limited concentration. After root absorption the active ingredient was translocated to the aerial plant parts in the transpiration stream. It was shown that the leaves were able to store the active ingredient temporarily. E 1059 accumulated to a larger extent in the peripheral regions of the leaf than in its centre, partly as the result of the blocking of the transpiration stream at the periphery. When Systox was sprayed or brushed onto the leaves, 35–40% penetrated into the leaf within 1 hour. The quantity of active ingredient penetrating into the leaf depended on the wettability of the solution, the speed of drying of the spray coating and the anatomical structure of the leaf. In the leaf the active ingredient did not diffuse over wide areas, and its movement was restricted by the connecting bundle parenchyma. When single leaves were treated the active ingredient moved to untreated plant parts, more apically than basally. Translocated quantities of active ingredient were only insecticidally effective when most of the plant was treated with a solution of normal concentration. The phloem was chiefly responsible for the translocation of the active ingredient after treatment of the aerial plant parts, although some also passed through the xylem. E 1059 was probably passively transported with the assimilates. It was stored temporarily by living cells; autoradiographs of leaf cross-sections showed large accumulations in the epidermis and in the cells of connecting bundle parenchyma. The toxicity of the plant was reduced by recretion, normally cuticular. The phosphatides probably took part in the elimination of the active ingredient. Removal of the active ingredient from the surface was effected by rain or evaporation.—Bayer Plant Protection Dept., Leverkusen.

1536. Ghosh, R., and Newman, J. F.
A new group of organophosphorus pesticides.
Chem. Ind. Lond., 1955, No. 5, p. 118.

The compound O:O′-diethyl S-β-diethylaminoethyl phosphorothiolate and its salts have proved highly effective and persistent systemic toxicants to the glasshouse red spider mite (*Tetranychus telarius*) on french beans and to the fruit tree red spider mite (*Metatetranychus ulmi*) on apples. In field trials against the latter during 1953 and 1954 a single application in June of the hydrogen-oxalate salt at 20 p.p.m. effected almost complete control throughout the season. The new compounds have shown remarkable differences in toxicity to different groups of insects.—I.C.I. Ltd.

1537. Houtman, G.
Over Tedion en Captan. **(About Tedion and captan.)**
Fruitteelt, 1955, **45**: 153.

Two lectures given before the Dutch Plant Pathology Society are briefly reported. (1) *Tedion, a new acaricide of Dutch origin*, by R. van der Veen: The material used at 3 mg. per litre gave 98% kill of young eggs and larvae, but did not affect adults. There was no apparent harmful effect on other insects or bees, and the material was applied to apples, cucumbers, roses and carnations without injury. Two applications in May and June are recommended for fruit, or 1 application if mixed with parathion. (2) *European experiments with the fungicide captan*, by L. P. Flipse: Known also as SR 406 and Orthocide, captan is as powerful a fungicide as copper and has a longer residual effect than other organic materials. It can be used as a preventive or curative spray for scab control, and sprayed fruit keeps better in storage. It assists healing when used as a wound dressing on wood damaged by hail or basal stem rot.

1538. (Murphy Chemical Co. Ltd.)
First reports on trials with Orthocide.
Grower, 1954, **42**: 1026.

Trials in Great Britain and Ireland have shown that Orthocide will control apple and pear scab, botrytis on strawberries and lettuces, blight on outdoor tomatoes, and black currant leaf spot. Russeting and cracking was reduced on certain apple and pear varieties including Cox and Doyenné du Comice. Powdery mildews were not controlled by Orthocide, nor was cladosporium of tomatoes. A full spray programme would cost £24 per acre compared with £5 or £6 for sulphur or mercurial sprays, but it is claimed that the increased cost is more than offset by the increased yield. [See also *H.A.*, 24: 3674 and 25: 319.]

Spray application and machinery.

(*See also* 1549m, r, 1656, 1657.)

1539. Thill, —.
Winterbehandlung der Obstbäume mit dem Nebelgerät. **(Winter spraying of fruit trees by a mist sprayer.)**
Techn. Landw., 1955, **3**: 65-6.

Winter sprays were applied to pome fruit trees by a mist sprayer to control San José scale. The materials used were Gebutox at 7·5%, yellow oil at 30%, and carbolineum oil at 50%. Spraying was done during very still weather. In the following autumn counts of living scales were made. On young trees sprayed with Gebutox only 0·25% of the original scale population was counted. On older trees which had received the carbolineum spray, but afforded more protection in their furrowed bark, 12% of the original infestation was counted.

1540. Garman, P.
A study of spray machines in Connecticut orchards.
Bull. Conn. agric. Exp. Stat. **567**, 1953, pp. 34, bibl. 24, illus.

Most of the bulletin is devoted to a detailed consideration of the operation of the mist blower or air blast machine, which is now considered the most economical spray unit available in Connecticut.

1541. Courshee, R. J., Daynes, F. K., and Byass, J. B.
A tree spraying machine.
Rep. N.I.A.E. **36**, 1954, pp. 19, bibl. 6, illus.

An account is given of the methods used to design a small volume tree sprayer and of the physical results obtained with it. Lack of experience in correlating indoor and field results made it necessary to embody a variety of components in the experimental sprayer. These are criticized and changes which should be made to them suggested. In Appendix I consideration is given to the way in which the deposit necessary to effect a required degree of control may be measured and specified in the form in which it can be of most help to the spraying machine designer. In Appendix II the details of the construction of the machine are recorded. [Authors' summary.]

1542. Wegenaar, C.
Beoordeling van gebruiksmogelijkheden van de Kiekens-Dekker rugnevelspuit. **(A review of the potentialities of the Kiekens-Dekker low-volume knapsack sprayer.)**
Fruitteelt, 1955, **45**: 197-8, illus.

Short reports are given on tests in which spraying was done by a knapsack sprayer. Satisfactory control was obtained of leaf aphid on apple and nursery crops, and of general pests and diseases on raspberries and blackberries. The 400 apple trees, which were 2·5–3 m. high, were sprayed in about 3 hrs by 2 workers using about 155 litres of spray. In the soft fruit tests 2 workers sprayed 1 hectare in 4 hrs using 130 litres of spray. The time taken to spray the nursery crops was slightly more with taller trees, but 2 workers took 3 hrs per hectare with 2½ m. high trees and 2½ hrs with 0·5 m. shrubs. Two operators are necessary, one to fill the tanks while the other sprays, with a change-over every hour.

Spray residues.

1543. Clark, P. J., and Jacks, H.
Arsenic residues on apples.
N.Z. J. Sci. Tech., Sect. B, 1955, **36**: 344-6, bibl. 1.

Arsenic residues are reported for apples sprayed with lead arsenate up to the end of December, 1953, and also throughout the season 1953–54. Where no arsenical sprays were applied after December, residues were below the legal limit of 1·5 p.p.m. Later spraying gave residues above this limit. [Authors' summary.]

1544. Fischer, W.
Spritzrückstände von DDT, HCH and E 605 an Obst. **(Spray residues of DDT, BHC, and E 605 on fruit.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 166-9, bibl. 34.

Results are given of the estimation of spray residues on harvested apples, pears and strawberries. These varied between 0 and 0·6 p.p.m. On apples and pears the highest amount of deposit was with DDT (0·3 p.p.m.), a smaller amount for BHC (0·03 p.p.m.) while only traces of E 605 were found. No residues were found in the fruit flesh. The amount of E 605 on strawberries at harvest fell from 0·2 p.p.m. to 0 within a week.

1545. Fransen, J. J., and Kerssen, M. C.
Biologisch onderzoek van dieldrin-residu's. **(Biological testing of dieldrin residues.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1954, **60**: 176-80, bibl. 1.

The effect of dieldrin films on insect mortality were compared with those of droplet residues, using *Calandra granaria* as a test insect. Differences in activity were large when the insects were exposed for 1–3 hours, the mortality from the film being much higher than from droplets. After 20 hours exposure, differences in activity were not so great. Dieldrin did not penetrate the wax layer of the plant; on glass and on leaves of Chinese and Danish white cabbage the activity of the residue did not diminish during 24 days.

1546. Gyrisco, G. G., and Burrage, R. H.
Effects of soil treatments with insecticides on plant growth and fruit quality of strawberries.
J. econ. Ent., 1954, **47**: 859-63.

In New York 7 insecticidal dusts were applied to the soil just prior to planting at concentrations effective for the control of white grubs under laboratory conditions. None of the materials used affected the growth, vigour or disease susceptibility of the strawberry plants, but under the conditions of these experiments only chlordane and lead arsenate did not impart off-flavours or odours to the fruit.

1547. Sharp, R. B.
The detection of spray deposits using fluorescent tracers.
N.I.A.E. Tech. Mem. **119**, 1955, pp. 7, bibl. 1, illus.

Fluorescent materials were tested for incorporation in aqueous spray solutions for the study of spray deposits. Primuline celacol solutions indicated spray patterns and made possible the quantitative estimation of the deposit.

1548. SHARP, R. B.
The estimation of lime sulphur residue.
N.I.A.E. Tech. Mem. **115,** 1954, pp. 5, bibl. 3, illus.

A method is described for the estimation of dried-out lime-sulphur residue on celluloid. The residue is dissolved in ammonium sulphide which is decolorized using sodium sulphite and the calcium content estimated volumetrically using sequestric acid. [Author's summary.]

Noted.

1549.

a BLUMER, S.
Viruskrankheiten an Obstbäumen. (**Virus diseases of fruit trees.**)
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 516-19, 525-9, 1955, **64**: 2-11, illus.
Diseases of pome and stone fruit.

b BRANAS, J., AND BERNON, G.
Le plomb de la vigne, manifestation de la carence de bore. (**The "lead" disorder of vines, sign of boron deficiency.**)
C.R. Acad. Agric. Fr., 1954, **40**: 593-6, bibl. 6.
See *H.A.*, 25: 277.

c CROWDY, S. H.
Antibiotics in the systemic control of plant disease.
Research, Lond., 1954, **7**: 483-6.

d DEPARTMENT OF AGRICULTURE FOR SCOTLAND.
Strawberry diseases and pests.
Adv. Leafl. Dep. Agric. Scotland **9,** 1954, pp. 10, illus., 1s.
With note at the end on certification schemes.

e GOTTLIEB, D.
Antibiotics and plant protection.
FAO Plant Prot. Bull., 1954, **3**: 1-3.
The present position.

f HAYNES, H. L., AND OTHERS.
Cyclethrin, a new insecticide of the pyrethrins-type.
Contr. Boyce Thompson Inst., 1954, **18**: 1-16, bibl. 8.

g JACKS, H., AND OTHERS.
Orchard spray trials in 1953-54.
Orchard. N.Z., September, 1954, Suppl., pp. 11, bibl. 3.
Results are tabulated of 22 experiments on pests and diseases of apples (19) and pears (2), and fabraea scald of quince.

h JOHANSEN, C. A., AND OTHERS.
Residual action and toxicity of methoxychlor and parathion on the cherry fruit fly.
J. econ. Ent., 1954, **47**: 746-9, bibl. 4.
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Insects and diseases of the pecan in Florida.
Bull. Fla agric. Exp. Stats **499,** 1952, pp. 76, bibl. 3, illus. [received 1955].
A complete revision of Bulletin 411 [see *H.A.*, 17: 688].

o POST, J. J.
Apparatuur voor het bepalen van infectieperioden van de schurftzwam. (**Apparatus to determine infective periods of the scab fungus.**)
Fruitteelt, 1955, **45**: 160-1, illus.

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Die Versuche des Jahres 1953 zur Bekämpfung des amerikanischen weissen Bärenspinners (*Hyphantria cunea* Drury). (**Studies in 1953 on the control of the American fall webworm (*Hyphantria cunea*).**) [Russian and English summaries 2 pp. each.]
Acta agron. hung., 1954, **4**: 279-312, bibl. 12, illus.
A German version of Hungarian original [see *H.A.*, 24: 2508].

q SMITH, E. H.
Seasonal fluctuation in control of plum curculio with lead arsenate.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 66-70.
Factors influencing the susceptibility of the plum curculio to lead arsenate.
J. econ. Ent., 1954, **47**: 871-9, bibl. 2, illus.

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Die ziekte-bestrijding met motor- of nevelspuit. (**Disease control by power- or mist-sprayer.**)
Fruitteelt, 1954, **44**: 1079-81.
Costs compared.

s Stalder, L.
Über die Verwendungsmöglichkeiten von Antibiotika im Pflanzenschutz. **(On the use of antibiotics in plant protection.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 28-31, bibl. 14.

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Untersuchungen über die Graufäule (*Botrytis cinerea* Pers.) an Trauben. 2. Mitteilung. Über den Zucker- und Säureverbrauch des Pilzes und die Wirkung einiger Nährstoffe auf das Wachstum. **(Studies on grey mould of grape vine. II. On the sugar and acid requirements of the fungus and on the action of several nutrients on its growth.)** [English summary ¾ p.]
Phytopath. Z., 1954, **22**: 345-80, bibl. 28, illus.
For an abstract of Part I see *H.A.*, 23: 4017.

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Research work on the diseases of apple and peach in 1953.
Proc. 99th annu. Mtg N.Y. St. hort. Soc., 1954, pp. 98-112.
Apple scab, peach leaf curl and brown rot.

v Taylor, R. E., and Byrde, R. J. W.
Control of *Nectria* eye-rot of apple by an eradicant fungicide.
Plant Path., 1954, **3**: 72, bibl. 2.
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Chestnut blight and resistant chestnuts.
Fmrs' Bull. U.S. Dep. Agric. **2068,** 1954, pp. 21, illus.
Endothia parasitica.

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Über neuere Untersuchungen zur Überwinterung der grünen Pfirsichblattlaus (*Myzus persicae* Sulz.) an Holzgewächsen. **(The overwintering of the green peach aphid (*Myzus persicae*) on woody plants.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 169-71, bibl. 11.
On *Prunus serotina.*

y Zotov, V. V.
Characteristics of carbohydrate metabolism in vine roots affected by phylloxera. [Russian.]
Biohimija, 1954, **19**: 649-51, bibl. 7, illus.

WEEDS AND WEED CONTROL.

General.

(*See also* 1218, 1219, 2294.)

1550. Timmons, F. L., and others.
Perennial weeds.
Res. Progr. Rep. 14th west. Weed Control Conf., 1954, Tucson, Ariz., pp. 1-14.

A summary is given of 13 reports from 7 states on control of 8 perennial weeds and is followed by the individual reports. Dalapon at 37·5 and 75 lb. per acre gave better control of Bermuda grass (*Cynodon dactylon*) and Johnson grass (*Holcus halepensis*) in California than did TCA at 75 and 150 lb. per acre. Dalapon applied under fruit trees caused no injury to apples, pears or vines but damaged peaches, oranges and cherries. In Colorado 7 different formulations of 2,4-D applied in an apple orchard at 1 and 2 lb. per acre controlled field bindweed (*Convolvulus arvensis*) without injuring the apple trees or a few pear trees present. Herbicidal applications on uncropped land, canal banks or without noting crop effects were also made to the 3 above-mentioned weeds and to reed canary grass (*Phalaris arundinacea*), blueweed (*Helianthus ciliaris*) leafy spurge (*Euphorbia esula*) Russian knapweed (*Centaurea repens*) and Canada thistle (*Cirsium arvense*).

1551. Danielson L. L. (chairman) and others.
Report of the Research Coordinating Committee of the Northeastern Weed Control Conference for 1954.
Suppl. to Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 9-54.

Reports received in response to an enquiry are summarized under headings including: weed control application equipment; weed control in vegetables; raspberries, blackberries and blueberries; strawberries; cranberries; orchards; commercial nursery and ornamental plantings; turf; control of herbaceous perennial weeds; woody plants; water weeds; and tabular summary of weed control in specific crops. Where chemical applications are given it is made clear whether the treatment is recommended for general use, field trial or experimental use only.

1552. Parris C. G. and Rodgers E. G.
Herbicidal control of undesirable vegetation on railroad rights-of-way.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 188-93.

Thirty herbicidal treatments applied at 3 different stages of weed growth for controlling undesirable vegetation on railroad rights-of-way were tested in Florida in 1953. Better control of practically all weed species was obtained from applications made during very early growth than during later, more rapid, vegetative growth or growth stages approaching maturity. The most effective material used was a mixture of TCA-sodium chlorate at the rate of 40–80 lb. per acre applied at 60-day intervals. CMU and Weed Killer D applied early at 30 lb. or more per acre were also very satisfactory. [From authors' summary.]

Particular weeds.

(*See also* 1877.)

1553. Hattingh I. D.
"Geelblom" control.
Fmg S. Afr. 1954, **29**: 525-6, illus.

"Geelblom" (*Alectra vogelii*) is a root parasite of legumes. Control may be obtained by inducing germination of the parasite by growing cowpeas, sugar-beans or soybeans. The legumes are cut and ploughed under before further growth and seeding can take place. Linseed, Mennonite sunflower and maize will also induce germination.—Coll. Agric., Potchefstroom.

1554. Narasimhan, M. J., and Thirumalachar, M. J.
A *Sclerotinia* disease of *Orobanche cernua* in Bihar (India). [German summary.]
Phytopath. Z., 1954, **22**: 421-8, bibl. 5, illus.

A *Sclerotinia* disease of *Orobanche cernua* has been found to be widespread in Patna, Bihar, causing a wet rot of the flowering scape. The hosts of *Orobanche*, such as tomato, eggplant, mustard, etc., were found to be unaffected by the *Sclerotinia* species. In the limited number of inoculation experiments made, the fungus was found to infect only *Orobanche* and failed to infect potato, tomato, and mustard plants. [From authors' summary.]

1555. Peters, R. A.
Some factors involved in the chemical control of quackgrass.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 257-64, bibl. 2.

Factors affecting the effectiveness of sodium TCA for quackgrass (*Agropyron repens*) control were studied in Connecticut, from November, 1951, to November, 1953. Ploughing prior to application was found markedly to increase the amount of kill. Best control was obtained following sufficient rainfall to leach the herbicide into contact with the rhizomes, followed by several days of scanty rainfall. By dividing a given rate of the chemical into 2 applications several weeks apart, the chances were increased of experiencing a period with a favourable rainfall pattern. Dalapon was compared with sodium TCA in preliminary tests and was found promising as a herbicide for quackgrass irrespective of rain, since it is absorbed by the foliage and translocated to the rhizomes. [From author's summary.]

1556. Pridham, A. M. S.
***Artemisia vulgaris*—control in nursery plantings.**
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 233-4.

In both laboratory and field trials chloro-IPC proved most promising against *Artemisia vulgaris*.

1557. Mune, T. L., and Parham, J. W.
Tobacco weed—tovako ni veikau (*Elephantopus mollis* H.B.K.).
Mune, T. L.
Tobacco weed control in Vanua Levu.
Agric. J. Dep. Agric. Fiji, 1954, **25**: 21-2, bibl. 1, illus., and 23.

Elephantopus mollis is a pest of agricultural and plantation lands and is a declared noxious weed in all the Fiji Islands. When young it is sensitive to liquid herbicides containing 2,4-D and/or 2,4,5-T and to MCP dust.

1558. New South Wales Department of Agriculture.
St. John's wort should be sprayed at flowering time.
Agric. Gaz. N.S.W., 1954, **65**: 537.

Applications of 2,4-D ester, at the rate of 3 lb. per acre, sprayed at flowering time, gave the best chemical control of St. John's wort.

Control of aquatic weeds.

1559. Meadly, G. R. W.
Weeds of Western Australia. Water hyacinth (*Eichhornia crassipes* Solms).
J. Agric. W. Aust., 1954, **3**: 577-81, illus.

Water hyacinth, a primary noxious weed in Western Australia, can disorganize irrigation systems. Successful control has been obtained by aircraft application of 6–8 lb. acid equivalent of the amine salt of 2,4-D in 2 gal. water per acre.

1560. Hodgson, J. M.
Aquatic weeds: submersed and emergent.
Res. Progr. Rep. 14th west. Weed Control Conf. 1954, Tucson, Ariz., pp. 111-24.

Nine reports submitted provide information on control of various aquatic weeds as well as on the effect of certain promising herbicides on some crops. Endothal was very satisfactory against some submersed waterweeds, but when applied regularly in irrigation water at 100 and 200 p.p.m. concentration it killed 2 out of 3 tomato plants within 15 days, although it caused only slight injury to Flame Tokay vines. Up to approximately 25 p.p.m. of 2,4-D in the irrigation water applied regularly appeared to stimulate tomatoes, but even lower concentrations damaged grape vines. Responses of tomatoes and vines to given concentrations of CMU, RADA, sodium salt of 2,4-D, and borascu in irrigation waters are noted.

Control of woody plants.

(*See also* 1634a.)

1561. Prescott, L. H., and Stamper, E. R.
The application of chemical herbicides to chickasaw rose and palmetto in Louisiana.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 289-93, bibl. 3.

Against chickasaw rose (*Rosa bracteata*) 4 lb. of low volatile ester of 2,4-D in 100 gal. of solution per acre was found most satisfactory. As carriers straight oils and emulsions with detergents plus kerosene were most effective. Palmetto (*Sabal minor*) was controlled with 2,4-D and 2,4,5-T at 4 lb. per 100 gal. of kerosene or varsol. Plants growing in full sunlight were more susceptible to the treatments than those in shaded areas.

1562. Darrow, R. A., and McCully, W. G.
Response of post and blackjack oaks to aerial spray applications of herbicides.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 238-41.

Single applications of 2 lb. per acre of low-volatile esters of 2,4,5-T or 3 lb. per acre of 2,4-D/2,4,5-T esters in 1 gal. of diesel fuel and 3 gal. of water have given an average of 30–34% control of post oak and 12–19% control of blackjack oak. Under favourable conditions, up to 60–80% control of both post and blackjack oak has been obtained with these herbicides. In recent tests, butyl esters of 2,4,5-trichlorophenoxypropionic acid [2,4,5-TP (Silvex)] at 1 and 2 lb. per acre have given initial defoliation superior to that obtained with

2,4,5-T ester. [From authors' summary.]—Tex. agric. Exp. Stat.

1563. McCully, W. G.
Response of post and blackjack oaks to different volumes of herbicides applied as basal and soil treatments.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 242-4, bibl. 4.

Low volatile esters of 2,4,5-T and 2,4-D/2,4,5-T combined were applied basally as 8, 12 and 16 lb. acid equivalent per 100 gal. in diesel oil. Each concentration was applied to the lower 12 inches of post and blackjack oak stems at volumes based on 20, 40 and 60 ml. per inch diameter measured in the centre of the treated band. Within a given concentration percentage kill increased progressively with successive increases in volume of application. On the basis of equivalent amounts of herbicide applied per unit stem diameter, higher kills were obtained with a relatively high volume of low concentration than with a lesser volume of a high concentration. Preliminary tests involving placement of the herbicide solution adjacent to the primary axis of the plant 4 inches beneath the soil surface have given good kills of trees 6 inches or less in diameter. Oil solutions of 2,4-D and 2,4,5-T as low volatile esters gave complete kills at rates of 8 lb. acid equivalent per 100 gal. in volumes based on 60 ml. per inch diameter. Water was ineffective as a carrier. Placement of one-half of the total volume on opposite sides of the stem was as effective as four injections around the stem. [From author's summary.]—Tex. agric. Exp. Stat.

1564. Meadors, C. H., Fisher, C. E., and Behrens, R.
Factors that influence the effectiveness of 2,4,5-T for the control of mesquite.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 257-60.

Studies in Texas have shown that effective and economical control of mesquite depends largely on season and plant condition. Maximum effectiveness from aerial application of 2,4,5-T is usually obtained 60 to 70 days after the first leaves appear in the spring. Since control depends on effective translocation it is best achieved when rapid growth of leaves and stems has ceased after development of a uniform, heavy foliage cover, at which time there is rapid movement of food from leaves and stems to the roots. Other factors discussed are soil type and site, weather conditions, carriers, formulation, droplet size and rate of application used.

1565. Leonard, O. A., and others.
Undesirable woody plants on irrigation systems, forest and range lands.
Res. Progr. Rep. 14th west. Weed Control Conf. 1954, Tucson, Ariz., pp. 25-60.

The principal chemicals tested in the reports submitted on control of woody plants were esters and amines of 2,4-D, 2,4,5-T and their mixtures. Of the information provided perhaps that of greatest horticultural interest is the control, in Utah, of western chokecherry (*Prunus virginiana* var. *melancarpa*), an important carrier of virus X of stone fruits. As foliar treatment a 50: 50 mixture of propylene glycol butyl ether esters of 2,4-D and 2,4,5-T at 2,000 p.p.m. concentration in water, applied over 3 seasons, gave the best result against chokecherry. A basal spray application of the same mixture at 8% concentration in diesel oil in April, 1952, and repeated in June, 1953, gave almost 100% kill of top growth and was likely to prevent re-sprouting. A tabulated classification of herbicidal responses of some 70 species is given.

1566. Waywell, C. G.
A progress report on the control of hawthorn.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 431-4, bibl. 3.

In Ontario basal spray treatments were applied to the lower 12 in. of trunk of over 3,000 hawthorn trees (*Crataegus* spp.). A 4% 2,4-D butyl ester in fuel oil applied at the rate of 2 gal. per 50 trees was the most successful treatment, giving over 90% kill. While satisfactory results were obtained throughout the year, applications from October to March were the best. [See also *H.A.*, 24: 3734.]

1567. Smith, D. M., Hutnik, R. J., and Paulsen, H. A., Jr.
Relationship between concentration of basal sprays and mortality of red maple sprout clumps.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 435-9, bibl. 2.

It has been demonstrated that, at least in one case, the probit of mortality resulting from basal spraying with 2,4,5-T bears a straight-line relationship to the logarithm of the concentration of the spray. If it can be established that this relationship has wide application, systematic tests of different concentrations could be vastly expedited. Where a relationship of this kind applies, the economic wisdom of seeking kills greater than 90 or 95% is open to serious question. The concentration of 2,4,5-T required for a satisfactory kill, when applied in basal sprays, increases very rapidly with stem diameter. Costs for material can be held to a minimum, only if undesirable woody vegetation is treated when it is young and small. [Authors' conclusions.]

1568. Meyers, W. A., Beatty, R. H., and Allen, W. W.
Report on two years results of dormant basal sprays on mixed brush.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 453-8, bibl. 3.

2,4,5-T was applied in oil and oil-water at 80 to 100 gal. of spray material per acre, and both the concentration of the material and the oil-water ratio were varied. Results have indicated that on species such as oak and red maple, which sprout from the root collar, best kills were obtained where high rates of oil and high concentrations of 2,4,5-T were applied. For root suckering species such as sassafras and locust just the opposite held true, best kills resulting from lower concentrations of 2,4,5-T and a lower ratio of oil to water.

1569. Hoy, J. M.
Manuka blight. Scale insects associated with manuka species in New Zealand.
N.Z. J. Agric., 1954, **89**: 601-4, bibl. 7, illus.

The introduced scale insect *Eriococcus* is associated with both red manuka (*Leptospermum scoparium*) and white manuka (*L. ericoides*). Infested plants show a heavy coating of sooty mould (*Capnodium walteri*) on lower leaves and stems, and the combination of insect and fungus, known as manuka blight, causes the death of red, but not of white manuka. The insect has been effectively spread throughout both islands by artificial means. Control of the insect may be obtained, if desired, by oil emulsions, wettable DDT or BHC nicotine sulphate, but such sprays would only be feasible and economic for specimen trees or small stands of *Leptospermum*. [See also *H.A.*, 24: 3736.]

1570. Dekatov, N.
Chemical control of shrubs. [Russian.]
Kolhoz. Proizv., 1955, **15** (1): 41-3, illus.

Alder, birch and other shrubby growth growing along roadside verges, drainage ditches and irrigation canals can be effectively controlled with 2,4-D. The material is used at 3 kg. per ha. in 150 l. of water when applied by aeroplane or in 250 l. when applied by ground equipment. The best time for treatment was found to be when the plants were in full leaf but new growth had not yet lignified. Very heavy growth may have to be re-treated with 1–2 kg. per ha. MCP applied at similar or slightly higher rates gave similar results.

Weed control in fruit crops.

(*See also* 1381, 2299.)

1571. Ure, C. R.
Die Unkrautbekämpfung in der Baumschule mit Crag-Herbicide-1. (**Weed control in nurseries with crag herbicide 1.**) [English, French and Spanish summaries 6 lines each.]
Mitt. Klosterneuburg, Ser. B, 1954, **4**: 256-8.

In 1952 trials were carried out on the use of Crag herbicide 1 to control *Chenopodium album*, *Amaranthus retroflexus*, *Portulaca oleracea* and *Setaria viridis*. In nurseries of 1-year-old apple, plum and cherry seedlings and Columbia crab apple cuttings a concentration of 5 kg./hectare gave satisfactory control without any sign of toxicity. Applications of stronger concentrations resulted in leaf curling in Columbia crab apple, though there was no check to growth. Weed susceptibility varied considerably, *Amaranthus* and *Portulaca* being the most susceptible species.

1572. Wesley, R.
An unusual discovery regarding the effect of sodium chlorate on cherry trees.
J. Pk Adm., 1955, **19**: 317-19.

In the spring and summer following the use of sodium chlorate to clear weeds from gravel verges in the Borough of Southgate [see *H.A.*, 24: 2551] a large number of ornamental cherries [*Prunus avium* and *P. hisakura*] became unhealthy and many died. No other tree species were affected. It is suggested that, though conclusive evidence is lacking, cherries may be exceptionally sensitive to this herbicide.

1573. Strauss, E.
Versuche über Unkrautbekämpfung bei Erdbeeren mit Crag-Herbicide-1. (**Weed control in strawberries with crag herbicide 1.**) [English, French and Spanish summaries 5 lines each.]
Mitt. Klosterneuburg, Ser. B, 1954, **4**: 254-6.

Trials were carried out on the varieties Mme Moutot, Sieger and Mieze Schindler, using crag herbicide 1 at the rate of 1 g. per sq. m. The chief weeds were *Digitaria sanguinalis*, *Solanum nigrum*, *Senecio vulgaris*, *Stellaria media* and *Lamium amplexicaule*. Two sprays applied at a fortnight's interval in May gave almost complete weed control. The rate used produced slight leaf curling on 1-year-old plants and for them a weaker solution is recommended.

1574. Watson, A. J.
Field performance of dalapon, a new grass controlling herbicide.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 200-4, bibl. 3.

Dalapon at 20 to 40 lb. per acre gave good control of Johnson and Bermuda grasses, but to prevent re-infestation re-treatment or subsequent tillage was necessary. Directed sprays of 2 to 6 lb. per acre controlled annual grasses infesting some agricultural crops, and apples, pears and raspberries appeared adequately tolerant of the material to permit its use for grass control around the base of the plants. [See also *H.A.*, 25: 484.]

Weed control in ornamentals and nurseries.

1575. Finn, T. P., King, L. J., and Vlitos, A. J.
Crag Herbicide-1 (sodium 2-(2,4-dichlorophenoxyethyl sulfate) for preventing weeds in flowers, shrubs and nursery stock.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 239-49, bibl. 2. [Presented at the 1953 NEWCC.]

Results obtained with crag herbicide-1 for weed control in ornamental evergreen trees and shrubs, deciduous trees and shrubs, tree and bush fruits and annual and perennial flowers are summarized in 4 tables. Under optimum conditions no injury due to phytotoxicity was reported from any of the 14 sources of information. Injuries noted usually occurred on unestablished plants or were caused by overdosing or unfavourable soil moisture conditions. Weed control was consistently good.

1576. Kramer, J. A., Jr., and King, L. J.
Further studies with Crag Herbicide 1 (SES) on ornamentals and nursery stock.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 211-13, bibl. 3.

Further good results are reported by contributors and by the authors working at the Boyce Thompson Institute on the use of crag 1 in ornamental nursery stock, established roses and flowers. It is reported from commercial nurseries that chemical treatments are considerably cheaper than hand weeding.

1577. Pridham, A. M. S.
Fall application of herbicides in nurseries. Effect on nursery stock.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 227-9.

Cut twigs of 5 species of woody ornamentals were treated in late autumn and winter with 5 herbicides at normal rates recommended for control of annual weeds. The results show that chloro-IPC was the least likely to injure dormant twigs, and dinitro herbicides the most likely. More injury was evident in these tests than in field tests with the same herbicides.—Cornell Univ., N.Y.

1578. Pridham, A. M. S.
Fall applications of herbicides in nurseries. Residual effect in soils.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 231-2, bibl. 1.

Results of the tests described indicate that chloro-IPC, endothal and NIX leave relatively less toxic residues in the soil than the dinitros.—Cornell Univ., N.Y.

1579. Day, B. E., and Russell, R. C.
Chemical control of weeds in field-grown roses.
Res. Progr. Rep. 14th west. Weed Control Conf. 1954, Tucson, Ariz., pp. 106-8.

In California cuttings of the rose variety Dr. Huey set out during the first week in January were irrigated twice a week for the first 2 months, and then less frequently. Weed control experiments were started in February, when CMU at 2 and 4 lb. per acre proved effective, but in the spring, after the roses had rooted, similar applications caused injury. Phenyl carbamates, ineffective shortly after planting because of heavy leaching, were satisfactory when irrigation was less frequent. Dinitro and endothal caused little damage to the roses and each controlled specific weeds; their combined application is suggested.

1580. Dittmer, H. J.
Some observations on the effect of 2,4-D on sixty woody plant species.
Agron. J., 1954, **46**: 581.

A campus lawn was sprayed daily with 20 gal. of Esteron 44 for 16 days. Sixty woody plant species growing in this area showed toxicity symptoms typical of a root-absorbed poison. Siberian elm [*Ulmus pumila?*] and lilac were very susceptible to the spray. A Chinese raintree [*Populus tomentosa*], Chinese elms [*Ulmus parvifolia*] and Scots pines [*Pinus sylvestris*] were killed. A Rio Grande cottonwood [*Populus wislizenii*] showed only slight injury.

1581. Bing, A.
Gladiolus weed control experiments 1953.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 153-8.

Good early weed control was obtained by post planting pre-emergence sprays with dinitros, chloro-IPC and 2,4-D plus TCA, even when the soil conditions were not very favourable. Crag No. 1, 2,4-D, TAT-GW (2,4-D plus N phenyl-mercuriethylenediamine) and Alanap 1 might be more effective in moist, slightly packed soil. The treatments applied to large corms caused no measurable injury to flowers or reduction in corm production. Some treatments, however, injured the smaller stock.—Cornell Univ.

Weed control in tropical crops.

(*See also* 2161, 2295.)

1582. Story, C. G.
Central Sugar Experiment Station. Extension of weedicide investigations.
A.R. Qd Bur. Sugar Exp. Stats 1953/54, 1954, pp. 39-40.

The previously reported successful work with the sodium salt of 2,4-D on nut-grass (*Cyperus rotundus*) was extended to the butoxy ethanol ester of 2,4-D with excellent results; the rate of application was the equivalent of 1 lb. per acre sodium salt with 83% active ingredient. Another experiment showed that guinea grass (*Panicum maximum*) can be killed by one application of 100 lb. or 2 applications of 25 lb. of sodium TCA. Eradication is assisted materially by first mowing the old crop, or by spraying with sodium pentachlorphenate at 20 lb. per acre and then burning, prior to spraying the trichloracetate on to young regrowth. Para grass (*Brachiaria mutica*) is also amenable to treatment with this material at 50 lb. per acre, but at half the quantity some 30% of the plants recovered within 6 months. Sensitive weed (*Mimosa pudica*) was killed by the 40% mixed esters of 2,4-D and 2,4,5-T at ½ gal. per acre.

1583. George, K.
Control of weeds in sugarcane and banana fields by "Crag" Herbicide 1 (sodium 2,4-dichlorophenoxyethyl sulphate).
Sci. and Cult., 1954, **20**: 250-3, bibl. 3, illus.

Crag Herbicide No. 1 at a concentration of 1·0 oz. per gal. water and at a rate of 80 gal. per acre gave complete control for the duration of the experiment (a month) of germinating weed seeds in sugar cane and in bananas, when applied in mid-June and late April respectively, and had no toxic effect on the crops. In both cases the experimental plots were clean-weeded before treatment. The common weeds in the areas concerned are listed.

1584. Guzman, V. L.
Chemical weed control in sugar cane.
A.R. Fla agric. Exp. Stats 1952/53, p. 264.

The results of 4 experiments in newly planted cane are given. 2,4-D amine plus TCA gave the best results for both pre- and post-emergence control of weeds, notably grasses, the rates being 2+20 and 1·5+15 lb. per acre respectively, and the period of control being 75 days.

1585. King, N. C.
Some notes on chemical weed control.
S. Afr. Sugar J., 1954, **38**: 681, 683.

For sugar cane pre-emergence sprays should consist of 2–3½ lb. acid equivalent 2,4-D per acre, the rate depending on whether the line only or the line and interline are to be covered, and they should be applied when the ground is sufficiently moist for seeds to germinate. Post-emergence sprays should consist of 2 lb. acid equivalent 2,4-D plus 4 gal. contact herbicide (pentachlorophenol in aromatic oil) in 20–40 gal. water per acre.

1586. Loustalot, A. J., Muzik, T. J., and Cruzado, H. J.
Progress report on weed control in sugarcane with CMU.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 135-7.

On the basis of experiments in progress in Puerto Rico CMU appears to be an efficient herbicide for controlling both broad-leaved and grassy weeds in plant and ratoon canes. The most economical rates of application appear to be between 3 and 6 lb. per acre. The material was most effective when applied to freshly prepared or ploughed land and least effective when applied to land protected by cane trash or other debris. There was no visible crop injury even at a 9 lb. rate, but final evaluation of these experiments will not be available until yield records are obtained. A trial has been initiated to test the possibility of eliminating all hand hoeing by applying 2 or 3 lb. of CMU per acre at intervals of 5 to 6 weeks until the cane closes over.

1587. Stamper, E. R., and Hardcastle, W. S.
Weed control in sugarcane in Louisiana.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 138-42.

Tabulated data are presented comparing CMU, CIPC and URAB (phenyldimethylurea) with 2,4-D as check and TCA plus 2,4-D as accepted practice, for control of Johnson grass seedlings and for effects on cane yield and sugar production. [See also *H.A.*, 24: 1476 and 3744.]

1588. Motta, M. S.
Keep your land free from piano grass.
Ext. Circ. Dep. Agric. Jamaica **51**, 1953, pp. 5, illus.

It is recommended that large areas infested with piano grass, *Themeda arguens*, should be ploughed and cultivated and replanted with sugar cane or a smothering grass. Where only a few roots are present, these may be dug up and burned and the area treated with oil. Local or smaller infestations may also be controlled by herbicides such as TCA.

1589. Rivera, J. R.
Control of buñga ñg tubo (*Aeginetia indica* L.) with chemical weed killers.
Philipp. Agric., 1953, **37**: 407-21, bibl. 6, illus.

Field experiments in 1953 showed that complete control of *Aeginetia indica*, the destructive phanerogamic root parasite of sugar cane, can be obtained by spraying with 2,4-D amine or 2,4-D ester. At the seedling stage two 0·2% sprays at an interval of 9 days were required, at the preflowering stage two 0·1% sprays, and at the flowering stage one 0·1% spray. The treatment had no visible ill-effects on the cane.

1590. Myatt, O. W. D., and Rehbein, C. A.
A new cane-killing weed.
Cane Grs' quart. Bull., 1954, **18**: 51-2, illus.

This is the first record of attack on sugar cane by *Thesium australe*, a root parasite indigenous to Australia. Preliminary investigations suggest that cultivation may give some control, and show that 2,4-D and 2,4,5-T both give apparent kill of early spring growth.

1591. Tea Research Institute of Ceylon.
Weedicides.
A.R. Ceylon Tea Res. Inst. 1952, 1954, pp. 36-8.

2,4-D, IPC, PCP, MCPA and TCA were compared in the control of *Imperata cylindrica* and *Panicum repens*. Only TCA gave complete control of *Imperata cylindrica*, the minimum treatment being 3 applications at 50 lb. per acre. Against *Panicum repens* TCA was again the only effective herbicide, either alone or in combination with sodium chlorate or with pentachlorophenol. All the herbicides, especially TCA, damaged tea.

Weed control in turf.

(*See also* 1936, 1937, 2228.)

1592. DeFrance, J. A., and Hart, S. W.
Chemical control of mature, smooth crabgrass in lawns.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 381-4, bibl. 8.

In trials at the University of Rhode Island 3 weekly applications were made with 6 herbicides in August, 1953. Milcyanate (4% potassium cyanate and 96% Milorganite) broadcast by hand at 10 and 15 lb. per 1,000 sq. ft. gave 100% control of crabgrass, mainly *Digitaria ischaemum*, with only very slight, temporary turf discoloration. Given rates of PMAS and Sowa S-1998 (bis(lauryl, di-2-hydroxyethylamino) boronium fluoride) sprays and potassium cyanate dust provided over 92% control and also caused only slight discoloration. Potassium cyanate spray produced good weed control but quite evident turf discoloration. Sesin gave no control. [See also *H.A.*, 25: 450.]

1593. DeFrance, J. A., and Hart, S. W.
Crabgrass control with phenyl mercuric acetate on various strains of Colonial bentgrass turf at two levels of fertility.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 385-91, bibl. 3.

Scutl (0·75% phenyl mercuric acetate impregnated in vermiculite) was applied at 3·3 lb. per 1,000 sq. ft. 3 times in July, 1952, and again in 1953, to 4 strains of Colonial bentgrass turf fertilized with 2 and 4 lb. of N per 1,000 sq. ft. per season. The material was very effective against crabgrass, mostly *Digitaria ischaemum*, throughout, but the best results were obtained at the high fertility level where 100% control was usually achieved. There was considerably less crabgrass in untreated plots receiving a high rate of fertilization than in those receiving a low rate. PMA caused some turf discoloration in 1952 but practically none in 1953. —R.I. agric. Exp. Stat.

1594. Jagschitz, J. A., Cornman, J. F., and Fertig, S. N.
Selective clover control in putting green turf with endothal and 2,4,5-T formulations.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 399-410, bibl. 7.

Detailed results are given of 6 experiments conducted in New York in 1953 with 3 formulations of endothal and 4 of 2,4,5-T. Not a single application of either material gave safe and effective control of clover in putting greens. Some formulations, however, were found to be better than others, and in general more turf damage was caused by endothal than by 2,4,5-T.

1595. Ruehle, G. D.
Weed control on golf courses.
A.R. Fla agric. Exp. Stats 1952/53, p. 328.

Eleven different treatments were tested on Bermuda greens for control of the sedge *Kyllinga brevifolia* L. The only treatment giving complete kill without sterilizing the soil for a long period was urea applied dry at 150 lb. per acre. Within a week after treatment all surface growth was brown and appeared completely dead. Six weeks after treatment small scattered patches of Bermuda were growing and a few scattered tufts of nutgrass were growing feebly. There were no signs of life in the sedge.

Weed control in vegetables and tobacco.

1596. Danielson, L. L.
Experimental use of herbicides impregnated on clay granules for control of weeds in certain vegetable crops.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp.. 119-26.

In greenhouse and field trials CIPC impregnated on granular Fuller's earth (Attaclay) and tobacco pulp was applied to a number of vegetables, and Sesin impregnated on granular tobacco pulp to one crop. Granular applications of CIPC appeared to have about the same herbicidal efficacy as spray applications. The material applied over the foliage of tomato and pepper did not affect the plants greatly. Kale was tolerant of post-emergence applications of CIPC on Attaclay and Sesin on tobacco pulp granules both when used singly and in combination. Cantaloupes were severely damaged by post-emergence granular applications of CIPC.—Va Truck Exp. Stat.

1597. Davis, B. H., and Beatty, R. H.
Pre-emergence control of weeds in home vegetable gardens.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 145-51.

Of 17 materials tested on 18 seeded crops, including flowers, and 6 transplanted ones, the most promising one for pre-emergence use was an emulsifiable formulation of sodium pentachlorophenate, ACP-L-195A at 10 lb. per acre. Weed control extended well beyond the crop germination period. Crop response to chloro-IPC was also reasonably good, but weed control was not satisfactory. Crag No. 1, useful for post-emergence treatment, appeared unsuitable for pre-emergence application, as did even the least soluble forms of 2,4-D. [From authors' conclusions.]

1598. Roberts, H. A.
Pre-emergence treatment for vegetables.
Grower, 1955, **43**: 145-7.

Preliminary experiments have been made at the National Vegetable Research Station on the use of PCP as a fortifying agent for vaporizing oil, so that the volume of oil required for weed control could be reduced to an economic level. Vaporizing oil alone applied at 25 gal./acre, both undiluted and as an emulsion, gave inadequate weed control. The addition of 2 lb./acre of PCP gave very good control of most weed species. PCP sprays at this strength gave good weed control in onions and lettuce without causing serious injury to the crops. In another experiment with lettuce the volume of oil applied as an emulsion was reduced to 5 gal./acre, which with PCP gave 90% control of *Chenopodium album*; there was no apparent injury to the crop.

1599. Hansen, J. R., and Ogle, R. E.
Response of eighteen plant species to DPA (3,4-D), 2,4-D, and MCP.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 29-31, bibl. 4.

3,4-D was relatively more effective as a foliage spray than as a pre-emergence spray in comparison with 2,4-D. The selective toxicity of 3,4-D foliage spray was different from that of either 2,4-D or MCP. Snap bean and squash were more susceptible to 3,4-D than to the other 2 herbicides, while fodder legumes and some other species were more tolerant.

1600. Gard, L. N., Pray, B. O., and Rudd, N. G.
Herbicide residues. Residues in crops receiving pre-emergence treatment with isopropyl N-(3-chlorophenyl) carbamate.
J. agric. Food Chem., 1954, **2**: 1174-6, bibl. 6.

Horticultural crops concerned were head lettuce, spinach and onions. CIPC residues found at harvest were 0·004 p.p.m. in spinach following pre-emergence soil treatment 4 lb. CIPC per acre, 0·14 p.p.m. in onions after 8 lb. CIPC p.a., and 0·025 p.p.m. in lettuce after 5 lb. CIPC p.a.

1601. Noll, C. J., and Odland, M. L.
Weeding of seedling asparagus in a pre-emergence application.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 55-8, bibl. 1.

Results of 2 years' experiments in Pennsylvania indicate that 3 chemicals could probably be used successfully for weed control in seedling asparagus prior to emergence. They are: CMU at 1½ lb. per acre, Dowicide G at 12 lb. and Premerge at 1 gal. ACP-L-469, tested for only one season, showed much promise.

1602. Kates, A. H.
Chemical weed control in asparagus in newly set beds and older established beds—1953.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 63-7.

In New Jersey CMU at 1 lb. per acre gave the best results in newly planted asparagus beds, taking into account weed control, stand of asparagus and amount of dry matter of the fern. In 3- to 6-year-old producing beds, CMU at 1 and 2 lb. per acre resulted in best weed control. None of the chemicals used before harvest affected the yield or flavour of the asparagus. Plots treated after cutting in mid-summer remained free of weeds for the rest of the season.

1603. Marshall, E. R., and Ferrant, N. A.
Preliminary results with several new herbicides applied to asparagus plantings.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 59-62.

In New Jersey 9 herbicides were applied to established asparagus in the spring 2 days after the last discing. CMU and PDU (phenyl-dimethyl urea) each at 2 and 3 lb. per acre, and 2-methyl,4-chlorophenoxyethyl sulphate at 4 lb. per acre gave the best weed control and had the longest residual action. Only 2 of the less effective materials caused injury to the asparagus.

1604. Rahn, E. M.
CMU-value for weed control and effect on yields of asparagus.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 69-71.

CMU at 1, 2 and 4 lb. per acre gave excellent weed control in asparagus on a loamy sand soil. Two applications at 1 lb. per acre—before and after harvest—together with some tractor cultivation gave full season control of weeds. On soils of greater organic matter content higher rates of CMU may be needed. CMU at 1 and 2 lb. rates over a 2-year period caused no crop damage. On a border row which received 18 lb. of CMU over 3 years, no visible symptoms of injury have been observed to date. [From author's summary.]—Del. agric. Exp. Stat.

1605. Dolan, D. D.
Factors determining the effectiveness of pre-emergence herbicidal treatments.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 77-82, bibl. 7.

On a 9-year-old asparagus planting the effectiveness of pre-emergence treatments was reduced when the soil surface was sprayed at the time of maximum weed seed germination as compared with the same treatment applied 1 week before or 1 week after this date. Deep soil disturbance up to 27 days after treatment practically nullified the effect of treatment. Light disturbance by raking appeared harmless. The 2 herbicides used, Premerge at 2 gal. (6 lb. dinitro) per acre and chloro-IPC at 2 gal. (8 lb. chl.-IPC), were equally effective.

1606. Noll, C. J., and Odland, M. L.
Chemical weeding of lima beans.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 183-5.

In trials in Pennsylvania pre-emergence applications of 1½ gal. of chloro-IPC and ¼ gal. of Oktone were best with regard to both weed control and bean yields.

1607. Dallyn, S.
The effect of soil organic matter levels on several herbicides.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 13-20, bibl. 3.

Red beets and sweet corn grown on soils of high organic matter content were more tolerant of CMU than when grown on soils of low organic levels. A similar interaction between organic level and plant response existed with Crag but not with Sesin or 2,4-D. Increasing rates of CMU gave increasingly good reduction of weed population regardless of the organic matter level of the soil. Any given rate of the chemical, however, gave better weed control at the lower organic levels.

1608. Rahn, E. M.
Alanap-1 as a herbicide for vine crops in 1953.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 83-7, bibl. 3.

On a loamy sand soil with a low organic matter content, Alanap-1 at 2 lb. per acre applied immediately after seeding gave very good weed control in cantaloupe, cucumber, watermelon and squash. The emerging squash seedlings were severely injured by the treatment but the other crops were unaffected. In another trial, a 1 lb. rate had no significant effect on squash stand or yields. When the pre-emergence treatment was followed by a post-emergence application a month after sowing, at 1 lb. for squash and at 2 lb. for the other crops, the period of weed control was extended without significantly affecting yields.—Del. agric. Exp. Stat.

1609. Lachman, W. H.
Some observations on the use of Alanap-1 on vine crops.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, p. 89.

In 1953 it became obvious in Massachusetts that Alanap-1 gives satisfactory weed control only when the soil is moist or when rain follows the application. Cucumbers and musk melons appeared relatively tolerant to recommended dosages, but squashes and pumpkins were injured. Weed reactions to pre- and post-emergence treatments are indicated.

1610. Dallyn, S.
The effect of repeated applications of Alanap-1 on cucumbers.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 91-3.

As a result of 2 years' experiments on Long Island, pre-emergence application of Alanap-1 at 6 lb. per acre is considered safe in cucumbers. In addition it is suggested that growers should use a single post-emergence treatment at 4 lb. per acre on well established plants on a trial basis. This treatment would probably be most effective when applied after the first hand-weeding following pre-emergence control.

1611. Perkins, D. Y.
Pre-emergence weed control in muck grown seeded onions.
Post-emergence weed control in muck grown seeded onions.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 111-15, and 115-17.

Chloro-IPC gave the best control of purslane in both trials without causing crop injury. [See also *H.A.*, 25: 466.] The possibility of toxic accumulation of this chemical in the soil is being studied.

1612. Noll, C. J., and Odland, M. L.
Weeding of seeded onions with chemicals.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 187-9.

Taking into account weed control, onion stand and yield, the best results were obtained with a pre-emergence application of CMU at 1 lb. per acre, and a combined treatment with chloro-IPC at 1 gal. applied pre-emergence and potassium cyanate at 6 lb. applied post-emergence.—Pa agric. Exp. Stat.

1613. Noll, C. J., and Odland, M. L.
Weeding of cannery peas with herbicides.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 127-30, bibl. 1.

In 1 year's trial in Pennsylvania the most successfully used pre-emergence herbicides for canning peas were: chloro-IPC at 1 gal. per acre, CMU at 1 lb., and 2 MCP preparations at ¼ and ½ gal. rates. At the time of pea emergence cyanamide at 400 lb. per acre gave good weed control and significant yield increases. For post-emergence applications Premerge at ¼ gal. per acre in 25 gal. water was best.

1614. Marshall, E. R., and Curtis, L. E.
Weed control in peas with various herbicides.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 131-5.

One great advantage of the newer herbicides for weed control in peas is that they are effective in 25 gal. of spray solution per acre, while the previously used material (ammonium salt of DNOSBP) was applied in 75–100 gal. Of 10 materials tested in New York in 1953, Sinox PE (alkanolamine salt formulation of dinitro ortho secondary butyl phenol, containing 3 lb. of DNOSBP per gal.) was the most successful, giving very good weed control without causing crop damage. For pre-emergence treatment 1 and 2 gal. actual herbicide, emergence treatment ½ to 1 gal., and post-emergence treatment 1½ quarts were found to be satisfactory rates.

1615. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med ukrudtsbekæmpelse i ærter.
(Experiments on weed control in peas.)
Tidsskr. Planteavl., 1954, **58**: 355-6.

Recommendations, based on 4 years' trials at 6 Danish experiment stations, are given for the control of weeds in peas by the herbicide dinitrobutylphenol (DNBP).

1616. Menges, R. M., and Aldrich, R. J.
A comparison of Crag, derivatives of Crag, and CMU for pre-emergence weed control in tomatoes.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 137-43, bibl. 7.

In New Jersey 5 herbicides, each at 3 rates, were applied in 40 gal. per acre to field-grown tomatoes on 8 July, 1953. Yields of plants treated with crag (2,4-dichlorophenoxyethyl sulphate) and natrin (2,4,5-trichlorophenoxyethyl sulphate) compared favourably with the controls. The fruit was of relatively good quality and the plants showed no drastic hormone effects. Two other derivatives, benzoate and oxalate, reduced both yield and quality. CMU at ¼ and ½ lb. per acre rates produced good yields of excellent quality, but at the 1 lb. rate it decreased yield. Owing to dry weather there was no weed problem in these trials. On 15 August crag and natrin were applied at 1, 2, 3 and 4 lb. per acre immediately after disking and 5 days later. With both materials the first treatment gave much the better weed control. At the lower rates crag appeared superior to natrin, but at the higher rates they were about equal.

1617. Noll, C. J., and Odland, M. L.
Chemical herbicides as they affect yield of tomatoes.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 191-2.

All 5 herbicides used caused visible injury to the tomato plants. Sesin and natrin, however, did not significantly reduce the number of fruits and sesin did not significantly affect the total yield.

1618. Coggins, C. W., Klingman, G. C., and Woltz, W. G.
Progress report on weed control in flue-cured tobacco.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 143-50, bibl. 1.

Out of 24 chemical formulations considered 16 were used for pre-transplanting, transplanting and post-transplanting treatments in 1953 for weed control in flue-cured tobacco. All pre-transplanting and transplanting treatments gave poor weed control and/or damaged crops. The following post-transplanting treatments, applied after one cultivation, compared favourably with the cultivated check plots: Sesin (at 3, 6 and 9 lb. per acre), DCU (dichloral urea, 5 lb.), natrin (9 lb.), SES (3 lb.), SES (3 lb.) followed by KOCN (12 lb.), and KOCN (12 lb.) applied twice. The methods are, however, not yet recommended for general use. Scraping the plots for weed removal compared favourably with cultivation on the sandy loam soils used in these tests. [See also *H.A.*, 23: 608.]
—N.C. agric. Exp. Stat.

1619. Prasad, N.
Control of orobanche in tobacco by "Crag Herbicide 1".
Food and Fmg, February, 1954, reprinted in *Indian Tobacco*, 1954, **4**: 139.

In pot experiments at the Institute of Agriculture, Anand, 2,4-dichlorophenoxyethyl sulphate (crag herbicide No. 1) gave complete control of *Orobanche cernua* when applied as a pre-emergent spray at 2 oz. per gal. water, and killed seedlings up to 2 in. tall when applied as a post-emergent spray. The tobacco plants were unaffected.

Herbicides and apparatus.

(*See also* 1634b, c, e.)

1620. Swezey, A. W., and others.
Chemical and physiology studies.
Res. Progr. Rep. 14th west. Weed Control Conf. 1954, Tucson, Ariz., pp. 125-60.

Fundamental herbicide studies on absorption, translocation, mode of action, persistence, plant response, effect of carriers and methods of application are reported from various research centres. Radioactive isotopes were used in many experiments.

1621. Davis, F. L., Selman, F. L., and Davis, D. E.
Some factors affecting the behaviour of dinitro herbicides in soils.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 205-7.

Plentiful water, light soil and a water-soluble formulation increased the downward movement of dinitro herbicides in soils.

1622. Davis, F. L., and Selman, F. L.
Effects of water upon the movement of dinitro weed killers in soils.
Weeds, N. York, 1954, **3**: 11-20, bibl. 5, illus.

Leaching of pre-emergence dinitro herbicides from the surface ¼ to ½ in. of soil to greater depths may result in poor weed control and root injury of the crop seedlings. Results of laboratory experiments showed that the oil-soluble, water-miscible formulations were moved much less in the soil by water than the water-soluble formulations. This suggests that an oil-soluble formulation applied in kerosene or other oil solvent might give better weed control on light-textured, sandy soils when application is likely to be followed by heavy rains.

1623. Weintraub, R. L., and others.
Studies on entry of 2,4-D into leaves.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 5-10.

Of 3 methods employed for measuring the entry of

2 4-D into leaves the use of radioactive material appeared the most useful. Some factors affecting 2 4-D entry have been established, but the mechanism of action still remains uncertain. "The bulk of the evidence indicates that absorption into the leaf is primarily by penetration of the cuticle, although it cannot be excluded that the stomates also may serve as portals of entry."

1624. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
A new contact and pre-emergence chemical—3,4-D—appears.
A.R. Hawaiian Sugar Planters' Ass. Exp. Stat. Cttee 1953/54, p. 66.

In preliminary trials 3,4-D was effective against both grass and broad-leaved weeds, resisted leaching when applied to the soil as the soluble sodium salt for pre-emergence control, and had little or no ill-effect when applied directly to the foliage of tomatoes, whereas 2,4-D caused serious injury and yield losses.

1625. ZEDLER, R. J., AND HARRY, J. B.
A comparison of the herbicidal properties of three chlorinated phenoxyethyl compounds: SES, natrin and sesin.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 231-6, bibl. 10.

The 3 materials discussed are non-volatile solids, requiring non-sterile soil for activation. They must be applied to weed-free plots since they are active against germinating seed. Certain agricultural seeds, however, are resistant to some pre-emergence applications. From data of laboratory and field studies the only result of direct horticultural interest appears to be that natrin is suitable for weed control in established tomatoes. It is also suggested that SES could be used to weed established 2,4-D resistant crops, such as strawberries.

1626. KREWSON, C. F., AND OTHERS.
Synthetic plant-growth modifiers. IV. 2-methyl-4-chlorophenoxyacetyl derivatives of amino acids.
Weeds, N. York, 1954, **3**: 28-37, bibl. 11.

In the tests described, the amino acid-MCP derivatives have shown marked selectivity in growth modifying action according to the kind of amino acid and optical isomer used and the type of plant to which the compounds have been applied.

1627. STANDEN, J. H.
Recent developments with the two contact herbicides, Good-rite N.I.X. and Good-rite oktone in greenhouse, nursery, and truck crop work.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 235-7.

New techniques and modified equipment are described for applying N.I.X. (sodium isopropyl xanthate) and Oktone (octachlorocyclohexenone) for maximum weed control and prevention of crop damage.

1628. HALE, M. G., CHAPPELL, W. E., AND HULCHER, F. H.
Effect of certain herbicides on O_2 uptake by soil previously enriched with nitrifiers.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 23-8, bibl. 4.

Of the 6 herbicides used PCP, 3-chl.-IPC, Dinitro and CMU markedly inhibited the oxygen uptake of enriched soil. Alanap-5 at the concentrations used was much less effective in inhibiting oxygen uptake and Dalapon at low concentrations caused an increase in oxygen uptake above that of the controls.

1629. DUNN, J. C.
Weed control properties of calcium cyanamide.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 227-30, bibl. 8.

The mode of action, rates and methods of application and uses of calcium cyanamide as a herbicide are discussed, and its fertilizing effect and basicity factor are mentioned. Pre-planting applications of calcium cyanamide give very good weed control in tobacco, vegetable and turf seed beds, compost and greenhouse soils; pre-emergence applications are particularly suitable for asparagus; and onions, canning peas and cucurbits are among the crops to which it may be applied after emergence.

1630. BUTLER, J. L., AND OTHERS.
Lightweight sprayer for experimental plots.
Agric. Engng St. Joseph, Mich., 1954, **35**: 874-5, bibl. 5, illus.

An illustrated description is given of a lightweight (105 lb.) herbicidal sprayer developed in Georgia. Although designed primarily for experimental work, it is believed that the sprayer might be adapted for other uses, especially for application of chemicals to horticultural crops on small areas.

1631. MCLANE, S. R., DEAN, E. W., AND MINARIK, C. E.
Precision sprayer for small plots.
Weeds, N. York, 1954, **3**: 75-9, bibl. 8, illus.

The herbicidal equipment described was designed at Camp Detrick, Frederick, Md, for experimental plots 3×18 ft. and smaller. It weighs about 20 lb. and costs under $ 100.

1632. WINCHESTER, J. A.
An experimental sprayer with leaf lifters for herbicidal applications in row crops.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 194-5, illus.

A small plot sprayer with leaf lifters to aid in placement of herbicides was found of considerable value for certain [unspecified] crops. By lifting the lower leaves of the crop plants the weeds are exposed and a wider range of contact herbicides can be safely applied to them.

1633. TINGEY, D. C., AND OTHERS.
Research techniques.
Res. Progr. Rep. 14th west. Weed Control Conf. 1954, Tucson, Ariz., pp. 161-4.

Descriptions are given of an experimental herbicidal spray equipment developed in California and of a field method for determining the effect of herbicides on the activity of soil micro-organisms used in Idaho.

Noted.

1634.
a COULTER, L. L.
Some aspects of right-of-way brush control with 2,4,5-T and 2,4-D.
Weeds, N. York, 1954, **3**: 21-7, bibl. 4.

b Preston, S. W.
Organic chemical herbicides.
J. Aust. Inst. agric. Sci., 1954, **20**: 221-7.
A review.

c Skogley, C. R.
The influence of wetting agents on the phytotoxicity of several herbicides.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 293-9, bibl. 6.
In most cases the addition of a wetter increased herbicidal activity.

d Southwick, L.
Progress report on agricultural uses of dalapon.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 251-6, bibl. 1.
For grass control.

e Weber, D. R.
The development of agricultural spray nozzles for weed control.
Proc. 7th annu. Mtg south. Weed Conf. 1954, Memphis, Tenn., pp. 197-9.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 1184, 1208, 1251-1268, 1275i, 1355, 1596-1617, 1802g, n, o, q, r, y, 2279, 2281, 2289, 2291, 2292, 2296, 2301, 2303.)

1635. Folley, R. R. W.
Market gardening in East Kent.
[*Mimeo. Publ.*] *Dep. agric. Econ. Wye Coll.*, 1954, pp. 11.

Information has been collected and is collated by the author on the finances during 1950–52 of 6 market gardens of varying acreages in East Kent. All were spending and receiving similar amounts of money each year. The average net income was £41 per acre on an average holding of 10·5 acres. There was an association between expenditure per acre, net income per acre, and total net income: growers on smaller holdings had to spend more per acre than those on larger holdings to earn the same net income. Profit per acre was highest on small acreages, profit per holding was highest on medium acreages, and profit as a percentage of capital was highest on larger acreages. It is also shown that it was more profitable to grow crops more intensively than to extend over more land. Average yearly revenue and expenditure figures, and figures showing how the total revenue was made up are tabulated.

1636. Brooke, D. L.
Some economic aspects of the Florida vegetable industry.
Diss. Abstr., 1954, **14**: 1484, being *Publ.* 9043 of 218 pp.

As a commercial vegetable producer Florida ranks third in harvested acreage and second in value of produce in the United States. Tomatoes, snap beans, potatoes, celery and watermelons account for 70% of the total acreage. Data obtained during 5 seasons showed that: costs of growing vegetables in different areas varied because of the amount of materials and labour required, the extent of mechanization, and variations in yield and weather. Costs of harvesting varied according to differences in yield, methods used, wages paid, distance to market, packing and container costs, and type of initial sale.

1637. Persson, A. R.
Hvordan blir en ny grønsaksort eller -stamme prøvet? **(How are new vegetable varieties and strains tested?)**
Gartneryrket, 1955, **45**: 19-22, illus.

A description is given of the official testing and classification of vegetable varieties in Scandinavia, with special reference to the system adopted in Norway. Here, the Institute for Vegetable Growing of the Norwegian College of Agriculture, acting for the Horticultural Research Council, has worked out a ten-year plan that gives priority to the more important out-door vegetables. The layout of the tests, which are carried out in several parts of the country, and the award of certificates are discussed.

1638. Priestley, G.
Use of honey bees as pollinators in unheated glasshouses.
N.Z. J. Sci. Tech., Sect. A, 1954, **36**: 232-6, bibl. 3.

Isolation of insect-pollinated plants for stock-seed production is a major concern in vegetable breeding. Insect-proof glasshouse cells, holding about 40 cabbage plants have successfully been used at the Crop Research Division. To obtain a satisfactory yield of seed under these conditions, it is necessary to introduce insects into the cells to cross-pollinate the selected plants. A method of using honey bees as pollinators in glasshouses was successfully tried in 1953 and a satisfactory yield of seed obtained. The honey bee technique is described and the associated problems are discussed. [Author's summary.]—D.S.I.R., Lincoln.

1639. Wolf, E. A.
Pelleted vegetable seeds.
A.R. Fla agric. Exp. Stats 1952/53, p. 263.

In field tests with pelleted and unpelleted seeds pelleting gave better germination under all conditions with cabbage and onion, equally good germination with endive except under conditions of excessive moisture, and poorer germination with lettuce in all cases.

1640. Dullforce, W. M.
Soil blocks and clay pots give equal results.
Grower, 1955, **43**: 305-7, illus.

Experiments were carried out to compare the effects of transplanting tomato, lettuce, cabbage and cauliflower plants from soil blocks and clay pots. The amount of compost used and plant spacing was the same for both containers. At planting time no significant differences in plant growth due to treatment were observed. The plants were grown on to cropping, and growth and yield were noted. Results showed no significant differences between the treatments for tomato, lettuce and cabbage. Pot-raised cauliflowers were somewhat earlier than those raised in soil blocks.—Univ. Nottingham Dep. Hort.

1641. Klykov, P.
The effectiveness of the ridge and furrow method of vegetable cultivation. [Russian.]
Social. seljsk. Hoz., 1954, No. 11, pp. 74-82.

When vegetables are grown under irrigation cutting the furrows after planting or sowing results in the seedlings getting covered with soil or, when the operation is postponed till the plants are bigger, in them drying out. A new method of procedure was developed consisting of cutting the irrigation furrows first and then sowing or planting on the levelled, raised land between. The method, including subsequent cultivation, is fully mechanized and the machinery and its operation are described. Crops grown included tomato, cabbage, cucumber and eggplant.

1642. Herrmann, F.-J.
Der Einfluss der Witterung und Beregnung auf den Ertrag verschiedener Gemüsekulturen. (**The influence of weather and irrigation on the yield of various vegetable crops.**)
Gartenbauwiss., 1954, **1** (n.s.): 160-72, bibl. 2.

Lettuce, kohlrabi, red and white early cabbage, beet, bush tomatoes, runner beans and celery were grown at Marhof during 5 years, and their yields are related to weather data. The brassicas, beet and beans gave their highest yields in 1951 which had a cool and dry spring. Tomatoes gave their best yield in 1950, when the summer was warmer than average. Celery reacted favourably to a long warm autumn, while lettuce liked a cool April, but warmth and rain in May. Irrigation of cabbage and beet resulted in high yields in cool years. Irrigation gave the biggest yield increase for all crops in 1952, which was very dry.

1643. Businger, J. A.
Nachtvorstbestrijding door middel van besproeiing. (**Frost protection by water-sprinkling.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1955, **18**: 21-34, 41, bibl. 13, illus.

A series of experiments was carried out on frost protection by water-sprinkling, using potatoes, tomatoes and runner beans as test plants. The influence of minimum temperature, wind speed, duration of break between sprays, and droplet size on the minimum rate of precipitation required was investigated. From results obtained a precipitation formula was worked out. A precipitation of 3 mm./hr was sufficient for protection in most cases, particularly when the minimum temperature was above $-5°$ C., the wind speed below 1 m./sec., and the break between sprays less than 1 minute. Small droplets were affected too much by wind speed. A rotary rainer with a low precipitation rate and a short break between sprays is recommended for frost protection.—Inst. Tuinbouwtechniek, Wageningen.

1644. Wahba, I. J.
The effect of varying minimum soil moisture level on growth and mineral absorption of some young horticultural crops.
Diss. Abstr., 1954, **14**: 1878, being *Publ.* 7591 of 125 pp.

It was shown that soil moisture was equally available for transpiration throughout the range between field capacity and permanent wilting percentage, but there was evidence that plant growth was promoted through an increase in soil moisture supply within the readily available range. Contradictory results were obtained regarding the effect of soil moisture supply on mineral element absorption and composition of the plants. Young plants of gladiolus, onions, sweet corn and kale were grown for 4 to 12 weeks in soil in open moisture containers at minimum soil moisture levels of 75%, 50%, 25% and 0%. The total plant growth and dry weight increases were greatest at the highest moisture levels regardless of any modifying factors. This effect was intensified by lowering available nutrients or increasing plant density. The uptake of Ca, Mg, K and P per plant increased with soil moisture supply. The concentration of K and P in plant tissue also increased. When the supply of a single element or combination of elements was increased, the total amount taken up by the plant generally also increased, but uptake of other elements was sometimes depressed. An increase in total supply of plant nutrients tended to offset the unfavourable effects on growth of a decreasing soil moisture supply.

1645. Golińska, J.
Wyniki prób zaprawiania niemotylkowych roślin warzywnych szczepionką azotobaktera. (**The effect of inoculating non-leguminous plants with azotobacter.** [English and Russian summaries ½ p. each.]
Rocz. Nauk rol., Ser. A, 1954, **68**: 613-26, bibl. 22.

Investigations were conducted over 5 years, under field conditions, on the effect of azotobacter on tomato, cauliflower, early and midseason cabbage and celery. Inoculation had a favourable effect on early plant growth, but later this diminished and there was no significant effect on the yield of any of these crops.

1646. Skene, J. K. M., and Kefford, R. O.
Manganese deficiency in vegetable crops. Part 1.—Facts for the vegetable grower. Part 2.—Plant and soil investigations.
J. Dep. Agric. Vict., 1954, **52**: 505-9, and 1955, **53**: 13-22, bibl. 4, illus.

Manganese deficiency occurs in the Melbourne district principally on podsolic sands. Deficiency symptoms are briefly described for crucifers, beetroot, peas, french beans, parsnips and cucurbits. Deficiency only occurred after liming had raised the soil level to above pH 6·3. Trials were carried out on podsolic deep sands and a sandy-clay loam at North Narre Warren using cabbage, sprouts and beetroot. The yield and quality of these crops was improved by soil applications of S or $MnSO_4$, and by sprays of $MnSO_4$. An effective and economical treatment consisted of 2 sprays of 1% $MnSO_4$ applied at a fortnight's interval. Soil application of $MnSO_4$ at 60–100 lb. per acre before planting, or at 50–100 lb. per acre as a side dressing also gave effective control. Careful application of side-dressings is necessary as young beetroot plants were scorched by large dressings near them. Large applications of up to 600 lb. per acre of $MnSO_4$ improved crops in some cases but there were also toxic effects. There was an indication of a residual effect of $MnSO_4$ applications for at least 1 year on the North Narre Warren soil.

1647. Martin, D. C.
The absorption and translocation of radiostrontium by the leaves, fruits and roots of certain vegetable plants.
Diss. Abstr., 1954, **14**: 1875, being *Publ.* 9951 of 162 pp.

Strontium applied to the roots of tomato, beet and bean plants was absorbed and translocated to all aerial plant parts. In general its absorption was proportional to its concentration in the nutrient solution and also to its concentration relative to Ca. Accumulation of strontium was possible in tomato and beet tissues in amounts equivalent to the normal Ca content, but such concentrations were usually phytotoxic. Beet was less sensitive than tomato and could accumulate high concentrations in plant tops. Radiocalcium, radiostrontium and radiobarium were absorbed by tomato and beet roots, and translocated to all aerial parts. Both strontium and barium tended to accumulate in the vascular tissue. Tomato fruits accumulated little strontium. Tomato plants with high Ca absorbed more ionic strontium from root applications than those with low Ca. Absorption of chelated strontium was greatest in tomato plants with low Ca. Plant Ca content had little effect on strontium absorption by beet. The movement of strontium, calcium and barium from the site of a foliage or fruit application was only very slight or lacking. Bean and beet plants showed slightly more downward movement than tomato plants. Chelation of strontium did not increase movement away from treated tomato leaves or fruits. It was shown by autoradiography that radiostrontium could penetrate the intact skin of a tomato fruit and accumulate in the inner tissues.

1648. Lobb, W. R.
Sulphur investigations in North Otago.
N.Z. J. Agric., 1954, **89**: 434-8, illus.

Preliminary experiments on crop response to S have been carried out on the tarry soils of N. Otago. Sulphur deficiency in French beans and turnips is shown by small, though not malformed leaves, with marked interveinal chlorosis. Fertilizers including superphosphates with and without S were compared. Plants on all plots receiving S responded to treatment, while no correction of S deficiency was apparent on those treated with fertilizers not containing S. The probable optimum rate of S application on these soils lies between 20 lb. and 28 lb. per acre.

1649. Grainger, J.
Climate, host and parasite in crop disease.
Quart. J. roy. met. Soc., 1955, **81**: 80-8, bibl. 16.

The effects of climate on both host and parasite were studied in eelworm attacks on potatoes and in clubroot (*Plasmodiophora brassicae*) attacks on swedes. The studies on the second of these diseases are summarized by the author as follows: Correlation coefficients have been calculated for comparisons over eight years between the percentage of clubroot disease on swede turnips and monthly means of air and soil temperatures, bright sunshine and rainfall, for the separate months from May to October. Significant and near-significant correlations show that a low incidence of the disease is associated with a relatively high soil temperature in July, relatively high amounts of bright sunshine in June, July and September, relatively low rainfall in September and relatively high rainfall in October. The differential effect of soil temperature on host and parasite with potato-root eelworm is a "disease-escape" mechanism, but the effects of bright sunshine on the amount of clubroot disease are considered to be, in the present setting, an effect upon disease involving growth of the host.—W. Scotland agric. Coll., Auchincruive.

1650. McCabe, L. C.
Atmospheric pollution.
Industr. Engng Chem., 1954, **46**: 93A-94A, bibl. 8.

The article is a summary of the work done at Los Angeles by Mader, Cann and Palmer, who will shortly publish a paper on their investigation. They studied the effect of industrial oxidation products on the composition of spinach leaves damaged by smog in the field and experimentally in a fumigation chamber, with special reference to organic acids. Injured leaves showed a steep rise in formic acid, and other acids were also affected.

1651. Canada, Minister of Agriculture.
Vegetables.
A.R. Canada Minist. Agric. 1953/54, 1954, pp. 31-3.

Carrot diseases: A soil application of 4% formaldehyde solution reduced the percentage of violet root rot infection (*Rhizoctonia crocorum*). *Cucumber diseases:* Iscothan dust was an effective protectant against powdery mildew (*Erysiphe cichoracearum*). *Tomato diseases:* Loran Blood and Moscow proved to be resistant to *Verticillium* wilt. *Swede turnip diseases:* soil applications of Vancide 51 largely prevented early infection of seedlings by clubroot. *Root maggots:* beans were protected from seed-corn maggot by seed treatment with lindane and aldrin; control of cabbage maggot on turnips was obtained by DDT sprays in Prince Edward Island, and by soil applications of heptachlor or aldrin in British Columbia; onion maggot control was obtained by seed treatment with DDT, aldrin or dieldrin.

1652. Wurgler, W., Staehelin, M., and Bolay, A.
Recherches sur la phytotoxicité de l'hexachlorocyclohexane (HCH). **(Research on the phytotoxicity of benzene hexachloride, BHC.)** [German, Italian and English summaries ¼ p. each.]
Landw. Jb. Schweiz, 1954, **3** (n.s.): 975-86, bibl. 10.

Insecticidal concentrations of BHC were phytotoxic to the first developmental stages of several test plants including beet and beans. The toxicity of commercial products was dependent on the content of the γ-isomer (lindane), which slowed down stem and root growth and caused root thickening behind the growing point. Toxic effects were produced when the quantity of lindane was higher than 12·1 g. per acre; temperatures above 20° C. increased toxicity. Field symptoms were less severe than laboratory symptoms, but are likely to occur when plants start growth under high temperature conditions, when more than 1,000 g. of lindane are sprayed per acre, or when it is used as a seed dressing.—Lausanne.

1653. Walton, R. R., and Howell, D. E.
Control of aphids on commercial greens crops by insecticides.
J. econ. Ent., 1954, **47**: 780-5, bibl. 11.

Six highly volatile insecticides showed promise for control of *Myzus persicae* on spinach and *Rhophalosiphum pseudobrassicae* on crucifers. Ethyl parathion, a mixture of ethyl parathion with methyl parathion, and lindane were the best. TEPP and nicotine sulphate were affected by temperature and BHC imparted a poor flavour. Dusts were more effective than sprays. A number of relatively non-volatile materials such as DDT, methoxychlor, chlordane and toxaphene were generally ineffective as they could not gain access to the aphids situated in wrinkles and pockets of the preferred curly type greens.

1654. Mariconi, F. A. M., and Zamith, A. P. L.
A "vaquinha" ou "burrinho" das solanáceas. (**Blister beetle, *Epicauta atomaria*.**)
Biológico, 1954, **20**: 147-57, bibl. 24, illus.

Bordeaux mixture and copper oxychloride as well as various chlorinated hydrocarbon insecticides and parathion gave protection in field trials against attack by *Epicauta atomaria* in beet, the plants still being free from insects 5 days after treatment whereas the controls were infested. In a dry-season test on spinach beet, spinach and capsicum, bordeaux mixture gave protection for more than 20 days.

1655. Fjelddalen, J.
Voksskjoldlus (*Lecanium hesperidum* L.). (**The soft scale.**)
Gartneryrket, 1954, **44**: 501-3, illus.

The parathion-resistant soft scale, *Coccus hesperidum*, is the most widespread scale insect in Norwegian glasshouses. Four years' experiments, data of which are tabulated, show that 4 applications (spraying or dipping) of 0·1% Systox at weekly intervals will control the pest satisfactorily. Simultaneous ant control with chlordane or dieldrin is necessary to prevent the spreading of scale larvae over the glasshouse.

1656. Cox, R. S., Harrison, D. S., and Yager, C. S.
A versatile spray rig for small field plots.
Plant Dis. Reptr, 1955, **39**: 48-50, illus.

A description with illustrations is given of a self-propelled spraying machine with a turning radius of 12 ft. constructed at the Everglades Experiment Station, Florida. Both low and high clearance spray booms are provided. The machine has been successfully used on sweet corn and pepper and could be adapted for use on most other vegetable crops.

1657. Potts, S. F., Spencer, R. A., and Friend, R. B.
Tests of a light-weight mist blower for row crops, small trees, and general uses.
Bull. Conn. agric. Exp. Stat. **572,** 1953, pp. 12, bibl. 9, illus.

The spray delivery rate and drop size produced was determined for several different pressures, outlets, and nozzle types and sizes. At the same spray delivery rate, a triple round outlet with cone type nozzles gave an effective swathe of 15 ft for row crops, compared to 10 ft for a fish tail outlet with fan type nozzles. Good control was obtained of potato aphid on tomatoes, Mexican bean beetle on beans, and mites on evergreens. For most row crops 5–10 gal. of mixture per acre were required. [From authors' summary.]

1658. Isenberg, F. M. R., Odland, M. L., and Jensen, C. O.
Effects of foliar sprays of maleic hydrazide on the storage and respiration of certain vegetable crops.
Bull. Pa agric. Exp. Stat. **584,** 1954, pp. 12, bibl. 7, illus.

In experiments with maleic hydrazide at concentrations of 500–4,000 p.p.m.: (1) low concentrations stimulated and high concentrations reduced or inhibited respiration; (2) field treatment did not prolong the storage life of beans or carrots; (3) field treatment prevented sprouting in onions. [See also *H.A.*, 25: 604.]

Asparagus.

(*See also* 1802i, x.)

1659. Jørgensen, M. B., and Henriksen, A.
Forsøg med forskellig jordreaktion til asparges og rabarber. (**The effect of soil reaction on asparagus and rhubarb.**) [English summary $\frac{3}{4}$ p.]
Tidsskr. Planteavl, 1954, **57**: 691-700.

Yields of asparagus increased from 17·9 to 27·2, 28·5, 31·1 and 32·5 kg./m.² when the soil pH value was raised from 5·7 to 6·0, 6·4, 6·8 and 7·5 respectively. Rhubarb varieties with red stalks showed increases in yield of about 30% on raising the pH value from 5·6 to 7·3, while soil reaction had little influence on a variety with green stalks. The trials were carried out on a sandy soil with a high organic matter content for 20 and 6 years respectively.—Spangsbjerg.

Bamboos.

1660. Young, R. A.
Flavor qualities of some edible oriental bamboos.
Econ. Bot., 1954, **8**: 377-86, illus.

Tasting tests are reported on fresh shoots, raw and cooked, of 16 species and varieties of bamboo, belonging mainly to the genus *Phyllostachys*. The species are classified on the basis of their acridity.

Brassicas.

(*See also* 1802h, s, u.)

1661. Finch, C. G.
Brussels sprouts variety trials, 1949-53.
J. nat. Inst. agric. Bot., 1954, **7**: 100-20, bibl. 1.

Replicated yield trials of brussels sprouts during 1949-53 are reported for the varieties Cambridge No. 1 (as control), Best of All, Masterman, Evesham Special, Masterpiece (two stocks), Ambassador, "XXX", Ashwell's and R. R. Smith's. Tables give the main descriptive features of the varieties, the cultural details from the 26 centres, the total yields of saleable and of grade 1 sprouts and also yields from the first, second and third picks in each trial. [Author's summary.]

1662. Finch, C. G.
Early cauliflower variety trials, 1950-3.
J. nat. Inst. agric. Bot., 1954, **7**: 87-99, bibl. 1.

Replicated yield trials of early summer cauliflowers during 1950-53 are reported for the varieties 110, Meteor, Pioneer, Remme, Snowdrift and Early Erfurt. Tables give the yields, times of maturity and curd qualities of each variety and of the cultural details in the 13 trials reported. [Author's summary.]

1663. Singh, H. B., and Sikka, S. M.
The new cauliflower with a future.
Indian Fmg, 1954, **4** (7): 16-18, illus.

Notes are given on an early variety of cauliflower [not named here] recently bred at the Indian Agricultural Research Institute, New Delhi, and on methods of cultivation and raising seed.

1664. Singh, U. P.
Preliminary studies in inducing seed set in cabbage in the plains of Uttar Pradesh.
Indian J. Hort., 1954, **11**: 100-3, bibl. 2.

Twenty-two cabbage varieties were sown in mid-July, and flowering and seed-producing characters observed. Early flowering varieties had a higher percentage of flowering and seed-producing plants than later flowering varieties. Three seed samples of the variety Naples Early were compared; the largest heads were produced by seed from compact-headed plants, the smallest from loose-headed plants, and imported seed gave intermediate-sized heads. Crosses are being made between Naples Early and Early Large Drumhead to produce a compact-headed, seed-producing hybrid for the plains.

1665. Wellington, P. S.
The heading of broccoli. Factors affecting quality and time.
Agriculture, Lond., 1954, **61**: 431-4, bibl. 4.

Recent observations on the effect of temperature and delayed transplanting on the time of heading and development of the curd suggest (1) that low temperature is necessary to bring about the change from the vegetative to the reproductive state, (2) that the plant may have to reach a critical size before curd initiation can take place, (3) that higher than normal temperatures after the start of heading may result in bract development and the break up of the curd with resultant poor quality heads. It is thought that a further analysis of the factors concerned, followed by selection to eliminate those individuals which grow abnormally when subjected to the least favourable combination of these factors likely to be met with in the field, might lead to a reduction in seasonal variation.—N.I.A.B., Cambridge.

1666. Strickland, A. H., and others.
Assessment of cabbage aphid damage in commercial brussels sprout crops.
Plant Path., 1954, **3**: 107-17, bibl. 3.

Studies have been in progress for 3 years to assess the effects of *Brevicoryne brassicae* infestation on the yields of brussels sprouts in various localities. Comparisons were made between untreated plants and plants in which aphids were controlled, mainly with schradan. The following were among the points emerging: Stalk weight and yield are closely correlated in sprouts, but neither height nor leaf number gives a good indication of growth. Aphid density is apt to differ considerably between months, years and sites, but there is a tendency for populations to build up until the latter part of September and then decline. Aphid damage affects the whole physiology of the plant and even quite low densities may reduce yields significantly. In 1952 and 1953 it is estimated that throughout England and Wales aphids reduced yields on the average by 12 and 13 cwt. per acre respectively, which represent approximately 15% of the crop in each year. [See also—for aphis sampling methods—Church and Strickland, *ibidem*, 3: 76-80, bibl. 6.]

1667. Rosborough, T.
Control of cabbage root fly in the seed bed.
Plant Path., 1954, **3**: 81.

In 6 brassica seedbeds in the Cirencester area 1·5% dieldrin dust gave better control of *Erioischia brassicae* than 5 other insecticides.—Roy. agric. Coll., Cirencester.

1668. Miles, M.
Field studies on the influence of weather on egg-laying by the cabbage root fly, *Erioischia brassicae* Bche. II.
Ann. appl. Biol., 1954, **41**: 586-90, bibl. 5.

The observations reported here and previously [see *H.A.*, 24: 1542] suggest that in England the summer generations of *E. brassicae* are of relatively little importance and that the risk of damage to susceptible crops set out after mid-May is negligible.—Wye Coll.

1669. Wilcox, J., and Howland, A. F.
Tests with DDT and other insecticides for control of the cabbage looper in Southern California.
J. econ. Ent., 1954, **47**: 937-8.

Cabbage looper, *Trichoplusia ni*, on both cauliflower and turnip was most effectively controlled by 10% toxaphene and 5% DDT plus 2% parathion dusts. DDT alone was the least satisfactory of the insecticides tested.

1670. Wene, G. P., and Otey, G. W.
Control of cabbage and carrot loopers.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 33-6, bibl. 1, illus.

Control of cabbage looper, *Trichoplusia ni*, was obtained by dusting with the following insecticides: 2% endrin; 2·5% dieldrin; 20% toxaphene; 12% toxaphene plus 8% DDT; and 5% perthane. Control of the carrot looper, *Rachiplusia ou*, was obtained by sprays of 0·3 lb. endrin per acre and by 3 lb. toxaphene per acre.

Celery.

1671. Ruprecht, R. W., and Westgate, P. J.
Water levels on celery.
A.R. Fla agric. Exp. Stats 1952/53, p. 171.

For 3 successive celery crops on fine sandy soil, those growing in plots with the medium water level (16 inches below the surface of the soil) have outyielded both those with the high (5 inches) and the low (26 inches). The low water level plots also outyielded the high in each case.

1672. GERALDSON, C. M.
The cause and control of black-heart of celery.
A.R. Fla agric. Exp. Stats 1952/53, pp. 293-4.

Field and greenhouse experiments in continuation of those previously described [*H.A.*, 24: 1546] show that black-heart can be completely controlled by foliar applications of 10–20 lb. calcium nitrate or 5–10 lb. calcium chloride in 100 gal. water directed into the heart at least once a week at the rate of 100–200 gal. per acre. It appears that the basic causes are calcium deficiency and/or altered metabolism resulting in a sudden temporary need for calcium, and that contributary factors are temperature, light, moisture balance, high soluble salt and over-fertilization. [See also *H.A.*, 25: 542.]

1673. YAMAGUCHI, M., AND WELCH, J. E.
Varietal susceptibility of celery to aster yellows.
Plant Dis. Reptr, 1955, **39**: 36.

One celery variety showed a significantly lower percentage of aster yellows virus infection than 2 others in a trial in California, but it is not clear whether this was due to differences in varietal preference shown by the leaf hopper vectors or to inherent differences in susceptibility to the virus.—Univ. Calif., Davis.

1674. SWANK, G., JR., AND PERRY, V. G.
Control of disease in celery seedbeds with methyl bromide.
Circ. Fla agric. Exp. Stats **S-55**, 1953, pp. 8, illus. [received 1955].

Effective control of damping-off and red root (both caused by *Rhizoctonia solani*, *Pythium* sp. and *Fusarium* sp.) and nematodes can be obtained in celery seedbeds for a period of 2 months by methyl bromide fumigation. Methyl bromide must be applied under an air-tight cover, and sisal Kraft paper or polyethylene sheeting have proved suitable as covers. Rate of application depends on the degree of infestation of the soil, and heavily infested areas should be fumigated at the rate of 1 lb. to 50 sq. ft. An exposure of 48 hours usually gives good results, but 72 hours may be needed on very wet soil with low temperatures. [See also *H.A.*, 24: 1547.]

1675. LIST, G. M., AND SYLVESTER, E. S.
The relationship of aphids to a toxicogenic disease known as aphid-yellows of celery.
Tech. Bull. Colo. agric. Exp. Stat. **50**, 1954, pp. 15, bibl. 3, illus.

Symptoms of general chlorosis, stunting of heart leaves, splitting and curvature of petioles, and prostration in celery were observed to be associated with *Aphis heraclella* infestations. Symptoms were experimentally produced by this insect which transmitted the capacity to produce these symptoms through the insect embryo. Diseased plants recovered when freed from aphid infestations, and produced viable seed. Although the symptoms resemble those of the western aster-yellows virus, aphid-yellows has not been transmitted by the virus vector or by mechanical means, and the evidence suggests that the causative agent was of toxicogenic origin.

1676. THOMAS, J. D., AND BEVAN, W. J.
Experiments on the control of carrot fly on celery.
Plant Path., 1954, **3**: 124-7.

Several dip, drench and spray treatments were compared in 1951 and 1952 against *Psila rosae* attacking celery in Lancashire. In the first year only drenching the soil round the plants with 0·05% γ-BHC or 0·09% toxaphene produced significant increases in crop, though dipping in 1% γ-BHC showed some promise. In 1952 dipping in 4% γ-BHC gave the best and most economical control. No phytotoxic effects were encountered in either of these trials, but in a similar trial in 1953 [not described here] dry weather following planting out resulted in a temporary check to the growth of plants that had been dipped.—N.A.A.S., Leeds.

1677. HOLDING, R.
A mechanical celery picker.
Market Grs' J., 1955, **84** (1): 38, illus.

An illustrated note is given of a device which cuts 2 rows of celery at a time and hoists it on to a trailer where trimmers cut off excess foliage. The machine almost doubles the rate of harvest.

Cucurbits.

(*See also* 1451, 1802b, e, f, w.)

1678. PERSSON, A. R., AND BRENNA, H. K.
Kultur-, sorts- og stammeforsøk i veksthusagurk. (**Cultural and variety trials with glasshouse cucumbers.**)
Gartneryrket, 1954, **44**: 836-8, bibl. 5, illus.

Hunderup gave somewhat higher yields than five other cucumber varieties and one F$_1$-hybrid tested. Eight strains of the variety Butcher's were also compared in respect of quality and yield. Training the plants as espaliers proved superior to cordon culture.

1679. WITTWER, S. H., AND HILLYER, I. G.
Chemical induction of male sterility in cucurbits.
Science, 1954, **120**: 893-4, bibl. 7, illus.

In greenhouse tests alpha-naphthaleneacetic acid or 2,3,5-triiodobenzoic acid sprays applied to the seedlings of 2 cucumber varieties and one squash variety reduced the staminate-pistillate flower ratio from 23: 1, 14: 1 and 1·47: 1 respectively to 8: 1, 2: 1 and 0·4: 1 respectively. In subsequent field and greenhouse tests on the squash variety, NAA delayed the appearance of staminate flowers, the plants producing pistillate flowers only for 8 days before any staminate flowers appeared, and several different treatments with maleic hydrazide gave complete male sterility during the 3–4 weeks' period during which the plants were allowed to flower. The pistillate flowers on the male-sterile plants were normal and fertile in almost all cases. Investigations now in progress suggest that the results reported here for Table Queen squash can be reproduced in many varieties of *C. pepo* and in other cucurbitaceous species, and may thus have widespread utility in making the production of hybrid seed an economic reality.

1680. Ito, H., and others.
Factors responsible for sex expression of Japanese cucumber. II. Anatomical studies on sex expression and transformation of cucumber flowers induced by pinching.
[Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **23**: 65-70, bibl. 6, illus.

An anatomical study was made of the growth of cucumber flowers with special reference to stamen and pistil formation. In the primordial stage all flowers carry both sets of sex organs. The application of growth substance and stem pinching induce the transformation of staminate flower buds into bisexual flowers, pistillate flowers or, basally, somewhat malformed lateral branches. A series of photographs shows the anatomy of flowers at different stages.

1681. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med forskellige typer af agurker i væksthus udplantet med forskellig planteafstand. 1950-52. **(Trials on the spacing of several types of glasshouse cucumber, 1950-52.)**
Tidsskr. Planteavl, 1954, **57**: 713-14.

The following methods of planting and training cucumber plants were compared: (1) Distance 30 cm., variety Read's Cordon, bearing on main stem; (2) distance 30 cm., Butcher's, cuttings from laterals, bearing on main stem; (3) distance 30 cm., Butcher's, seedlings, bearing on main stem; (4) and (5) distance 60 and 90 cm. respectively, Butcher's, seedlings trained in the traditional manner. The tabulated data show that close spacing is better than wider spacing and that seedling plants, provided they are trained to 1 stem, are better than plants raised from cuttings.—Virum.

1682. Nicolaisen, W., and Fritz, D.
Der Einfluss der Temperatur des Giesswassers auf den Ertrag von Gewächshausgurken. **(The influence of the temperature of irrigation water on the yield of glasshouse cucumbers.)**
Gartenbauwiss., 1954, **1** (n.s.): 173-80.

There was no detrimental effect on yield, in 2 seasons' harvests of glasshouse cucumbers, from watering plants with cold (11–14° C.) water. There was, however, an indication that cucumber quality was better from plants watered with warm (22–25° C.) water.—Tech. Hochsch., Hannover.

1683. Fröhlich, H.
Verbesserte Treibgurkenerträge durch Bodenlüftung. **(Improved cucumber yields resulting from soil aeration.)**
Dtsch. Gartenb., 1955, **2**: 21-3, illus.

Soil aeration with straw (illustrated) increased the yields of glasshouse cucumbers by over 16%, as compared with the controls grown in the same open compost soil. An addition of ⅓ stable manure to the compost raised yields only just as much as did aeration in the absence of manure.—Inst. Gartenbau, Grossbeeren.

1684. MacCollum, G. B.
A study pertaining to the effects and correction of DDT phytotoxicity to cucumbers.
Diss. Abstr., 1954, **14**: 1863-4, being *Publ.* 9764 of 110 pp.

Preliminary field tests showed that activated charcoal was highly effective in reducing the phytotoxicity of DDT dusts to cucumbers. No corrective action was noted with DDT sprays. A ratio of 3 parts of activated charcoal to 1 part of actual technical DDT counteracted the phytotoxic effect to the greatest extent. Tests showed that DDT wettable powder sprays were less phytotoxic than 2% DDT dusts, when the source of DDT was the same for both, and the addition of activated charcoal to such sprays failed to lessen the injury. Use of the spreader B-1956 intensified the phytotoxic effect, which was not lessened when activated charcoal was added to the spray. Five weekly applications of a 2% technical DDT dust with and without activated charcoal were made to 5 cucumber varieties, A and C, Marketer, Niagara, National Pickling and Yorkstate Pickling. In all except Yorkstate Pickling activated charcoal caused increased yields. Filtrates from DDT wettable powder produced no spray injury to plants, although the re-suspended residue did. The major constituents of technical DDT found in excess of 0·6% were applied in an acetone-Triton X-100 spray to young cucumber plants, at 3 times their concentration in the technical material. DDT injury was shown to be primarily due to the ortho para and para para isomers of DDT, the ortho para isomer being approximately twice as phytotoxic as the para para isomer. Tissue analysis showed that in general there was an accumulation of nitrate nitrogen and a depression of calcium in the chlorotic foliage of DDT-treated plants as compared to the normal foliage of untreated plants. The insecticidal contact effect of DDT against pea aphid and southern armyworm was reduced by activated charcoal, but not the stomach poison effect on armyworm. [See also *H.A.*, 24: 3831.]

1685. Singh, H. B., and Sikka, S. M.
"Summer Prolific" is a heavy yielder.
Indian Fmg, 1955, **4** (10): 20-3, illus.

Cultural notes are given on Pusa Summer Prolific, a new variety of bottle gourd introduced by the Indian Agricultural Research Institute, New Delhi.

1686. Division of Plant Industry, New South Wales.
Rock melon culture.
Agric. Gaz. N.S.W., 1954, **65**: 586-92, 605, illus.

Instructions are given for growing the rock melon. Almost the whole of New South Wales is suitable for the culture of melons, but growers on the Western Slopes and irrigated areas specialize in late crops of melons, growing the winter-keeping varieties. Varieties recommended for general culture include Powdery Mildew Resistant 45, Hale's Best and Honey Dew.

1687. Nylund, R. E.
The relation of defoliation and nitrogen supply to yield and quality in the muskmelon.
Tech. Bull. Minn. agric. Exp. Stat. **210**, 1954, pp. 24, bibl. 35.

The relationship of leaf area to yield and quality of muskmelons was studied for 2 seasons. Plants were pruned to remove 25, 50 or 75% of the leaves at various stages of growth. Light pruning (25%) had no significant effect on yield and fruit quality, but tended to hasten fruit maturity when the pruning was done during rapid growth of the plants. Moderate pruning (50%) at anthesis of first pistillate flowers had no significant effect on yield or quality of fruit, but later pruning reduced yield and quality. Severe pruning (75) at any stage after anthesis of first pistillate flowers reduced yield and quality. Such pruning 1 or 2 weeks before harvest, however, reduced yields only slightly, while fruit quality was greatly impaired. Earliness of fruits, soluble solid content of fruits, fruit weight, and degree of fruit netting were associated. Nitrogen applications increased yields, improved table quality of harvested fruit and hastened maturity. Nitrogen application had no effect on the relationships existing between leaf removal treatments and growth and fruiting. [From author's summary.]

1688. Fronk, W. D., and Peterson, L. E.
Some effects of treating muskmelons with insecticides.
J. econ. Ent., 1954, **47**: 807-11, bibl. 9.

The striped cucumber beetle, *Acalymma vittata*, not only seriously damages muskmelon seedlings but also acts as a vector of bacterial wilt, and its larvae injure the rind of fruits. From 1949 to 1952 various insecticides were applied to Hale's Best muskmelons in Iowa and the effects on insect population and plant condition were noted. Methoxychlor, aldrin, lindane, heptachlor and purified DDT slightly increased yields. There was a significant increase in yield from plants treated every 7 days over those treated every 3 days. Larval injury was reduced by dieldrin, aldrin, chlordane, BHC, EPN and DDT-parathion mixture. Plants treated with heptachlor, CS-708, dieldrin, aldrin, Q-137, TDE, EPN and purified DDT showed significantly greater vine growth than the untreated checks.

1689. Nishida, T.
Report on the control of melon flies.
Hawaii Fm Sci., 1954, **3** (2): 1, 6.

Marked reductions in melon fly [*Dacus cucurbitae*] infestations have resulted from conventional and mist blower applications of malathion, parathion, dieldrin, DDT and EPN to maize and wild vegetation bordering melon fields. The relationship between fly abundance and damage and reductions observed in mosaic incidence in malathion-treated fields are also discussed. [See also *H.A.*, 24: 3838.]

1690. Breakiron, P. L., Winston, J. R., and Kaufman, J.
Studies of watermelon loading for rail shipment, 1953.
Market. Res. Rep. U.S. Dep. Agric. agric. Market. Serv. **62,** 1954, pp. 27, illus.

Details are given of several different methods of loading watermelons and the results thereof on delivery of fruit. Loading the Congo variety crosswise in the car instead of lengthwise, the conventional method, resulted in 70% less bruising, 69% fewer cracked melons and 47% less surface scarring. Preliminary observations indicate that loading crosswise would entail little or no increase in loading time or material cost. Other packs were tried and their merits are discussed. [See also *H.A.*, 24: 3835.]

1691. DuPree, W. E., Woodroof, J. G., and Siewert, S.
Watermelon rinds in food products.
Bull. Ga exp. Stat. **285,** 1953, pp. 30, bibl. 23, illus.

Ways and means are given for removing the green and red portion from watermelon rinds which are then firmed, freshened, parboiled and made into preserves, pickles, spiced rinds, glacé rinds, jam, conserve and relish.

1692. Cipolla, G.
Podredumbre de los frutos del zapallo producida por *Fusarium scirpi* y *Stemphylium ilicis.* **(Rot of pumpkins caused by *Fusarium scirpi* and *Stemphylium ilicis.*)**
Idia, 1954, No. 77, pp. 2-4, bibl. 5, illus.

The symptoms of a rot of stored pumpkins observed in Mendoza province, Argentina, in 1953 were greyish-white masses of mycelium on the surface with hollow lesions beneath them. The fungi are thought to gain entry through wounds in the skin caused by frost.

1693. Miller, L. A.
Control of the squash vine borer.
Publ. Sci. Serv. Ent. Div. Dep. Agric. Canada **910**, 1954, pp. 4, illus.

Recommendations for controlling *Melittia cucurbitae* are to dust the plants with 2½% aldrin, 2½% dieldrin, 3% methoxychlor or 1% rotenone. Start as soon as the seedlings appear and give 3 applications at 7- to 10-day intervals.

Legumes.

(*See also* 1200, 1201, 1221, 1225, 1226, 1504, 1536, 1802m, p, t, v.)

1694. Sneddon, J. L., and Squibbs, F. L.
A description of climbing french bean varieties grown in the United Kingdom.
J. nat. Inst. agric. Bot., 1954, **7**: 121-30, bibl. 5, illus.

Twenty-five varieties of climbing french beans were grown and classified into 15 distinct types, descriptions of which are given. The diagnostic characters used are the size, shape, and colour of seeds and pods, which are of major importance, while habit, foliage, flower and hypocotyl colour assist in identification. A key to the varieties and a photograph of their seeds are included. [Authors' summary.]

1695. Kozlov, F. B.
Bean varieties for peaty soils. [Russian.]
Zemledelie, 1954, **2** (5): 123.

A description of 3 White Russian varieties distinguished by their drought and disease resistance.

1696. Inoue, Y., and Shibuya, M.
Studies on the reproductive physiology of common beans (*Phaseolus vulgaris* L.). II. On the fertility of pollen. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1954, **23**: 71-8, bibl. 18.

In pollen germination studies on the tall Kentucky Wonder and the dwarf Masterpiece beans (1) germinability was recognizable the afternoon before flowering; (2) percentage germination increased towards the time of anther-dehiscence and then decreased rapidly, the grains losing their vitality about 5-6 hours after anthesis; (3) the pollen was seen to be starchy; (4) the number of grains per anther was found to be small; (5) the optimum temperature and relative humidity for germination were 20–25° C. and 80% respectively. The germination rate of pollen grains of plants exposed to temperatures of 25–30° C. was greatly reduced.

1697. INOUE, Y., AND SUZUKI, Y.
Studies on the reproductive physiology of common beans (*Phaseolus vulgaris* L.). III. On artificial pollination. (Preliminary report.) [Japanese, with English summary 8 lines.]
J. hort. Ass. Japan, 1954, **23**: 79-81, bibl. 13.

The technique of crossing beans was studied in the dwarf Masterpiece variety. It was concluded that the best time for emasculation is 3 days before flowering and that artificial pollination should be carried out within 24 hours of emasculation, preferably in the morning.

1698. GAGNEBIN, F.
Note sur les graines potagères. L'éclatement des téguments et son origine génétique. **(Note on vegetable seeds. Integument bursting and its genetic origin.)**
Rev. hort. suisse, 1954, **27**: 383-4, bibl. 3, illus.

It is suggested that the bursting of the integument of bean seed has a genetical cause. It generally occurs with all the beans in one pod, but in only a few pods per plant. In beans there is only a small percentage of cross-pollination, and integument bursting in the seed could occur as a result of a dominant character for a large embryo in the pollen parent.

1699. GORTER, C. J.
Vermeerdering van het aantal bloemen bij bonen en tomaten door middel van 2.3.5.-Trijood-benzoëzuur (T.J.B.Z.). **(Increasing the number of flowers in beans and tomatoes by means of 2,3,5-triiodobenzoic acid.)** [English summary 8 lines.]
Meded. Dir. Tuinb., 1955, **18**: 35-41, bibl. 14, illus.

Young bean plants, variety Vroege Wagenaar, were watered with varying strengths of 2,3,5-triiodobenzoic acid (TIBA). The result was an increase in flower production, bean weight and number, and a slight increase in total leaf area. Tomato plants treated with TIBA solutions showed increased flower formation at the expense of vegetative growth. For practical use TIBA might be used on plants having vigorous vegetative growth but poor flower production.

1700. FARROW, R. C.
Stake press and stringing machine cut down labour costs in California bean fields.
Market Grs' J., 1955, **84** (2): 14, illus.

Two men using a tractor-mounted, hydraulically-operated stake press set 15 to 20 runner-bean stakes per minute compared with 1 to 2 minutes per stake for the old hand method. A stringing machine operated by 3 men strung 100 ft. per minute compared with 12 to 15 men needed to do the same job by hand. The machines are illustrated but not described in detail.

1701. SCHWARZE, P.
Beziehungen zwischen Peroxydasereaktion, Eiweiss-spiegel und Chlorophyllbildung. **(The relations between peroxidase reaction, protein level and chlorophyll formation.)**
Planta, 1954, **44**: 491-502, bibl. 23.

Bean plants which showed chlorophyll disorders, induced by magnesium deficiency or by lack of light, showed a greater peroxidase activity and a lower protein level (protein N/soluble N) than normal plants.

1702. QUANTZ, L., AND VÖLK, J.
Die Blattrollkrankheit der Ackerbohne und Erbse, eine neue Viruskrankheit bei Leguminosen. **(The leaf-roll disease of broad bean and pea, a new virus disease of legumes.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 177-82, bibl. 5.

The new virus described produces necroses in the phloem and causes yellowing and leaf-roll symptoms in peas and broad beans respectively. It appears that the two diseases are closely related, if not identical. The virus was transmitted by several species of aphid and found to have natural hosts in *Vicia sativa, V. narbonensis*, lucerne and *Pisum melanocarpum.* It seems to be a component of the foot rot complex of peas and as such perhaps constitutes a factor needing attention in the control of that important disease. In preliminary trials yellowing was reduced by applications of systox. Where avoidable, susceptible varieties should not be grown close to the winter hosts of the virus.—Inst. landw. Virusforsch., Braunschweig.

1703. ŠNEĬDER, JU. I.
Dusting bean seeds with granozan for halo blight control. [Russian.]
Zemledelie, 1954, **2** (4): 109-11.

Good control of halo blight [*Pseudomonas phaseolicola*] and substantial yield increases were obtained in field trials in 1952–1953 by treating the seed with "granozan". The rate recommended is 3–5 g. per kg. seed.

1704. WIERINGA, K. T.
Rode verkleuringen, waargenomen bij erwten en bonen. **(Pink discoloration of peas and beans.)** [English summary 5 lines.]
Tijdschr. PlZiekt., 1954, **60**: 259-60.

A pink discoloration observed in beans from Holland and peas from England was caused by *Bacterium rubefaciens.* The infection had probably taken place during unfavourable weather at harvest.

1705. MENZIES, J. D.
Effect of sprinkler irrigation in an arid climate on the spread of bacterial diseases of beans.
Phytopathology, 1954, **44**: 553-6, bibl. 1.

The effect of overhead sprinkler irrigation on the amount of bacterial disease damage to beans was studied under the typically arid climate of the Columbia Basin region of Washington. None of the 4 bacterial diseases that were observed occurs in this area on beans irrigated by the furrow method, but all have appeared late in the growing season on sprinkled fields. Experiments were conducted principally with *Xanthomonas phaseoli*, the cause of common bacterial blight. Using artificially established infection centres in fields irrigated by sprinkler for various periods, it was found that practically no spread of blight infection was obtained during July and August with up to 30 hours of continuous irrigation. In September, as the crop approached maturity, disease sometimes developed rapidly but because of late occurrence the damage was negligible. It is concluded that in the normal climate of this area beans can be irrigated by overhead sprinkling without serious danger from bacterial diseases, provided they are planted early enough to mature before October. [Author's summary.]

1706. WESTERN AUSTRALIA DEPARTMENT OF AGRICULTURE.
Bean rust.
J. Agric. W. Aust., 1954, **3**: 439-40, illus.

It was reported from New South Wales that rust (*Uromyces phaseoli typica*) had occurred on the rust-resistant runner bean variety Westralia. Tests showed that this strain was not true to name, and that Westralia maintains its rust resistance.

1707. BRIEN, R. M., AND JACKS, H.
French-bean rust (*Uromyces appendiculatus*) in New Zealand.
N.Z. J. Sci. Tech., Sect. A, 1954, **36**: 280-4, bibl. 3, illus.

French-bean rust (*Uromyces appendiculatus*) was first recorded in New Zealand in April, 1951. Symptoms, factors favouring infection and spread, and morphology of the causal organism have been described. Forty varieties of dwarf and runner beans have been tested for resistance by artificial inoculation. Preliminary tests have shown that lime-sulphur 1-150 plus colloidal sulphur 2 lb. to 100 gal. is effective in controlling bean rust. [Authors' summary.]—D.S.I.R., Auckland.

1708. JACKS, H.
Screening tests with fungicides for control of broad-bean rust.
N.Z. J. Sci. Tech., Sect. A, 1954, **36**: 274-9, bibl. 2.

Thirty-three fungicides were tested in the glasshouse for control of *Uromyces fabae* (Pers.) de Bary. Most effective compounds were lime-sulphur, Colsul 40, Cosan, Dithane Z78, Fermspray, Manzate, Thirospray, Fuclasin Ultra, Flit 406, Phygon XL, and Spergon w.p. Other test materials were not as effective as the above. [Author's summary.]—D.S.I.R., Auckland.

1709. LABEYRIE, V., AND MAISON, P.
De l'influence du microclimat sur la ponte de la bruche du haricot (*Acanthoscelides obsoletus* Say.) dans la nature. **(The effect of microclimate on egg laying by the American seed beetle, *Acanthoscelides obsoletus*, in the field.)**
C.R. Acad. Agric. Fr., 1954, **40**: 733-6, bibl. 5.

In experiments in the Landes in 1952 and 1953 on beans interplanted with maize, beans from the centres of fields were very much less heavily infested by *Acanthoscelides obsoletus* than those on the periphery or in areas cleared of maize. It was concluded that a direct relationship exists between the "coefficient of transmission of radiation" of the maize and the rate of beetle attack on dwarf beans, a relationship which implies the existence of a threshold level of insolation governing egg laying and consequently beetle population. Only beans growing under maize should be harvested at maturity for storage; those at the edge of the field should be harvested green.

1710. LATHROP, F. H.
The bean weevil and its control.
Bull. Me agric. Exp. Stat. **532**, 1954, pp. 34, bibl. 17.

Acanthoscelides obtectus attacks dry stored beans. Storing at a temperature of 50° F. or less prevents development of weevils. Heating at about 131° F. for 30 minutes will kill all stages. Diatomaceous dusts have proved successful, and the addition of from ½ to 2 oz. of a good commercial brand of starch dust to 100 lb. beans is found to give effective protection against weevil infestation likely to occur in commercial storage. Such dust is non-toxic and is readily removed by washing. [See also *H.A.*, 24: 2705.]

1711. WAGN, O.
Iagttagelser over optræden af bladrandbiller (*Sitona*-arter) i bælgplanteafgrøder. **(Observations on the incidence of pea and bean weevils in leguminous crops.)** [English summary 13 lines.]
Tidsskr. Planteavl., 1954, **57**: 706-12, bibl. 2.

Pisum sativum, *P. arvense*, *Vicia faba* and *V. sativa* were attacked only by *Sitona lineatus*, while *S. decipiens* was found on other leguminous crops in addition to *S. lineatus*.

1712. LITYŃSKI, M., AND WIŁKOJĆ, A.
Zastosowanie podczerwieni do zwalczania strąkowców (Bruchidae). **(Applying infra-red rays for control of Bruchidae.)** [English and Russian summaries 1½ pp. each.]
Roczn. Nauk rol., Ser. A, 1954, **69**: 625-39, bibl. 15.

A 3 minute exposure to infra-red rays emitted by an apparatus of 220 V. and 250 W. from a distance of 25–30 cm. gave excellent control of pea weevil, *Bruchus pisorum*, infesting pea seed, variety Szlachetna Perła [Noble Pearl]. Treatments of shorter duration gave less satisfactory results. For checking the effectiveness of infra-red rays, germinating the seed immediately after exposure was found most satisfactory, as under conditions of germination the remaining live insects leave the seed rapidly. The 3 minute exposure did not affect germination, but before the method is generally recommended for control of pests infesting seed further tests will have to be conducted to determine the reaction of seeds of other species and varieties.—Div. Hort., Agric. Coll., Wrocław.

1713. WENE, G. P., AND OTEY, G. W.
Control of bean leafhopper.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 30-2.

The leafhopper, *Empoasca solana*, on southern peas was efficiently controlled by a dust of 5% DDT plus 82% sulphur. Good control was also obtained by dusts of 5% DDT, 5% methoxychlor, 5% TDE, 1% parathion, 1% EPN, 10% toxaphene, 20% toxaphene, and sulphur. Sulphur also increased the efficiency of toxaphene. Aldrin, chlordane, heptachlor and lindane did not control the pest.

1714. ORTH, H., AND BREMER, H.
Zur Bekämpfung der "Bohnenfliege". (**The control of the bean seed fly.**)
Reprinted from *Anz. Schädlingsk.*, 1954, **27**: 87-8, bibl. 7, illus.

Seed disinfection of beans with a preparation containing mercury and lindane gave better control of *Delia cilicrura* than did 5 other chemicals and methods tested. —Inst. Gemüsebau u. Unkrautforschung, Neuss-Lauvenburg.

1715. SHUKLA, T. C.
Regeneration in *Lens esculenta* Moench.
Sci. and Cult., 1954, **20**: 238, bibl. 3, illus.

Seedlings of 3 varieties of *Lens esculenta* from which the cotyledon and/or the roots or the main shoot were removed 10–30 days after sowing grew normally and produced flowers and fruit. This phenomenon and the evidence of experiments by other workers on excised tissue of other plants lead the author to the conclusion that *Lens esculenta* can be propagated vegetatively in the season in which it is sown, and that injuries during cultural operations will not substantially damage the crop.—Dep. Biol., A.S. Jat College, Lakhaoli (Bulandshahar).

1716. SINGH, H. B., AND SIKKA, S. M.
Green peas.
Indian Fmg, 1954, **4** (9): 25-8, illus.

The varieties in commercial cultivation in different parts of India are named and notes are given on 5 imported early and main crop varieties recommended by the Indian Agricultural Research Institute, New Delhi.

1717. KISS, Á.
A borsózsizsik ellenállásra való nemésités kérdése. (**Breeding peas for resistance to weevil.**) [English and Russian summaries $\frac{1}{2}$ p. each.]
Növénytermelés, 1954, **3**: 317-22, bibl. 4.

In continuation of earlier work [see *H.A.*, 23: 4232] it was found that the degree of infestation by *Bruchus pisorum* varied greatly with both season and variety. Attempts to develop resistance by selection failed.

1718. DE HAAN, H.
The breeding of peas in the Netherlands. 1. Round blue peas.
Euphytica, 1954, **3**: 188-94, bibl. 6.

The Dutch varietal selection of peas, which has altered considerably since 1900, was changed by the introduction of varieties resistant to *Fusarium*. Work is still being carried on to improve yield, quality and reliability.

1719. DRAKE, F. R., AND KEHOE, J. K.
Response to molybdenum by peas.
J. Dep. Agric. Vict., 1954, **52**: 570, illus.

Symptoms of N deficiency were shown in a pea crop growing in a sandy loam with a pH of 5·4, although tissue tests indicated an adequate N supply. Plants receiving both superphosphate and ammonia also showed marginal leaf scorch. Sprays of ammonium molybdate, at $\frac{1}{8}$ oz. in 2 gal. water, were applied in late September, but caused no improvement in plants receiving only superphosphate. Leaf scorch in plants grown to the podding stage was corrected by the sprays. In plants which had received both superphosphate and sulphate of ammonia and were sprayed with the molybdenum solution in the early flowering stage, the sprays caused a marked improvement in growth rate and colour.

1720. SKOTLAND, C. B., AND HAGEDORN, D. J.
Aphid transmission of the Wisconsin pea streak virus.
Phytopathology, 1954, **44**: 569-71, bibl. 7.

The pea aphid (*Macrosiphum pisi* Ketb.) was found to be an inefficient vector of the Wisconsin pea streak virus, giving low percentages of transmission. [From authors' summary.]

1721. SEINHORST, J. W.
Een ziekte in erwten, veroorzaakt door het aaltje *Hoplolaimus uniformis* Thorne. (**A pea infection caused by the eelworm *Hoplolaimus uniformis*.**) [English summary $\frac{1}{4}$ p.]
Tijdschr. PlZiekt., 1954, **60**: 262-4, illus.

Peas growing in a light sandy soil showed poor growth and leaf yellowing, together with root rot and reddish discoloration of the vascular bundles. These symptoms were produced experimentally by growing peas in soil inoculated with *Hoplolaimus uniformis*.—I.P.O., Wageningen.

1722. LABRUYÈRE, R. E., AND SEINHORST, J. W.
Vroege vergeling bij erwten een aaltjesziekte. (**Early yellowing of peas, an eelworm infection.**) [English summary 5 lines.]
Tijdschr. PlZiekt., 1954, **60**: 261-2, bibl. 2.

Symptoms of early yellowing in peas could not be reproduced by inoculation with *Fusarium oxysporum* f. *pisi* race 3. The symptoms are probably caused by *Hoplolaimus uniformis*, an eelworm found in large numbers in the soil around the roots of infected plants.

Mushrooms.

(*See also* 1254, 2275, 2276.)

1723. BOTTOMLEY, A. M., AND TALBOT, P. H. B.
Common edible and poisonous mushrooms in South Africa.
Bull. Dep Agric. S. Afr. **324**, 1954, pp. 49, illus.

Descriptions with coloured illustrations are given of some 20 edible and inedible fungi.

1724. LOCQUIN, M.
Une chanterelle comestible de la Côte d'Ivoire: *Hygrophoropsis mangenotii* sp. nov. (**An edible fungus of the Ivory Coast: *Hygrophoropsis mangenotii* sp. nov.**)
J. Agric. trop. Bot. appl., 1954, **1**: 359-61.

A botanical description is given of a newly recognized fungus eaten by Africans and Europeans in the neighbourhood of Abidjan, Ivory Coast.

1725. TROCMÉ, S., AND SARAZIN, A.
Possibilités d'emploi d'un appareil mécanique dans la préparation de fumiers pour champignon. (**The possibility of using a machine in making mushroom compost.**)
C.R. Acad. Agric. Fr., 1954, **40**: 702-4, bibl. 1.

A wooden cylinder, rotated horizontally on its axis and capable of holding 600–800 kg. of straw or dry manure, was used experimentally to produce a mushroom compost. Water vapour and air entered at one end of the cylinder while fermentation gases escaped at the other. The original rate of turning, twice per minute, was unsatisfactory as it did not allow for sufficient aeration. The rotation rate was then reduced to ⅔ turn per minute and small ventilation holes were bored in the sides. About 600 kg. of stable manure were put into the cylinder after normal preparation with no chemicals added, and the internal temperature was raised to 65° [C.]. Rotation was stopped at the beginning of the 5th day, when the compost was in a state of "pasteurization", at a temperature of 52–55°, a saturated atmosphere, and no more than 3% CO_2. After 6½ days in the cylinder the compost was made up into beds. The yield of mushrooms obtained from these beds under somewhat unfavourable conditions was 6·8 kg. per square metre.

1726. Rasmussen, C. R.
Champignon tilskuds- og dækjordsforsøg. **(Experiments on mushroom soils and compost amendments.)**
Horticultura, 1954, **8**: 184-7.

Steam sterilization and the addition of sulphate of ammonia, lime, superphosphate and gypsum to mushroom compost, prepared from horse manure, considerably increased yields of both summer and winter crops, as compared with untreated controls and with the addition of gypsum only. There was no difference between 3 types of soil and 2 types of mushroom bed tested. The trials were carried out for one year at the Mushroom Department of the Agricultural College, Copenhagen, established in 1952.

Onions.

(*See also* 1215, 1223, 1254, 1802 1, 2297.)

1727. Scholes, M. E.
The effects of chlordane and toxaphene on mitosis in roots of the onion (*Allium cepa* L.).
J. hort. Sci., 1955, **30**: 12-24, bibl. 15, illus.

Experiments were carried out with 10% technical chlordane and toxaphene to determine whether, when used as insecticides, they had any effect on cell division. By germinating onion seed in direct contact with the insecticides it was shown that neither chlordane nor toxaphene affected germination, but that chlordane reduced the growth rate. The frequency of nuclear divisions was unaffected by toxaphene but reduced by chlordane. Both compounds affected the dividing cell by causing a delay in pro-metaphase and preventing nuclear reconstruction in telophase. In addition chlordane had a lethal effect on the resting cell. Pot experiments showed that a low dose of toxaphene had little effect on cell division, but a low dose of chlordane and a high dose of both compounds affected a large proportion of the roots examined. It was found that removal of a small fraction of chlordane would greatly reduce its phytotoxicity without reducing its insecticidal properties. Neither insecticide caused polyploidy, and in this respect they are preferable to BHC.—Elsenham, Bishop's Stortford, Herts., under A.R.C. grant.

1728. Hartsema, A. M., and Luyten, I.
Bloem- en zaadvorming bij zilveruien. **(Flower formation and seed production of silverskin onions.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1955, **18**: 49-56, bibl. 4, illus.

Investigations were made into the possibility of obtaining seed from silverskin onions in Holland. Experiments were started in August, 1947, with mature bulbs of the variety Pompei, which were stored at various temperatures. There was some loss during storage, and very few of the remainder produced flower stalks when planted out. The best temperature for flower formation was 13° C. The non-flowering material formed large bulbs, especially after high temperature treatments. Bulbs larger than 20 gm. were replanted in September, 1948, and produced 3·6–4 flower stalks from each bulb. The seed was 96–100% viable; it was used in a comparative trial with imported seed, but gave the lowest yield of bulbs. Seed sown in spring 1949 at a low rate gave a crop of large bulbs which were planted in August, some in the field and some in an unheated greenhouse. These produced a large number of flower stalks. Another group was stored during the winter, first at 27–28° C., and after December at 13° C.; of these, 50% died during storage. Of those planted out in the following March only a few produced flower stalks.

1729. Weydahl, E.
Stor eller liten stikkløk? **(Large or small onion sets?)**
Gartneryrket, 1955, **45**: 6.

Data are tabulated for total yields, number of bulbs exceeding 50 g. and average weight of bulbs harvested from onion sets of four sizes ranging from 19–22 mm. to 9–11 mm. Medium-sized sets (15–19 mm.) gave, on the whole, the most favourable results. On three types of soil tested applications of 60 kg. calcium nitrate per 1,000 m.² showed little advantage over applications of 30 kg.—Kvithamar.

1730. Service de l'Horticulture, Rabat.
Note sur un essai de production de bulbilles d'oignons de Mulhouse. **(Note on an experiment on the production of Mulhouse onion sets [in Morocco].)**
Terre maroc., 1955, **29**: 20-2, and (*Mimeo. Publ.*) *Serv. Hort., Maroc*, 1954, pp. 4.

In view of the importance which the production of onions for dehydration may assume in Morocco, a programme of studies on the Mulhouse onion was inaugurated in 1953. An account is given of an experiment at Rabat in 1954 which showed that in the climate of the coastal region sets can readily be produced by sowing at the beginning of April, stopping irrigation in late May or early June, and harvesting as soon as the tops have dried out completely. The sets stored well.

1731. Ferguson, A. C., and Fauber, H.
The effect of certain commercial fertilizer combinations on yield, grade, and storage quality of Sweet Spanish onions.
Tech. Bull. Colo. agric. Exp. Stat. **52,** 1954, pp. 12, bibl. 2.

The effects of N, P and K applied singly and in various combinations before sowing to Sweet Spanish onions were tested over a 4-year period. An application equivalent to 6-24-4 fertilizer at 462 lb. per acre produced an average of 295 fifty-pound sacks per acre in the period 1950-52. Single applications of N and P_2O_5 both increased yield, but K_2O by itself gave no yield increase. Rates of application above 30-120-20 were not necessary for maximum yields. Yield increases were higher after an alfalfa crop than after barley. Yields were unaffected by applying half the fertilizer before seeding and the remainder as a side-dressing in mid-June. Increasing dosages of N and P_2O_5 gave increasing yields up to the 30-120-20 rate, but the effect of potash on yield was not apparent. There were indications that bulb formation and maturity were delayed and yields were lowered by giving excess N. Applications of 30-120-20 fertilizer increased the percentage of 3-in. bulbs. Storage losses from sprouting and rots were not affected by fertilizer treatments in 1949–51.

1732. Kumar, K., and Sahay, R. K.
Effect of sulphur fertilization on the pungency of onion.
Curr. Sci., 1954, **23**: 368-9, bibl. 1.

Elemental S was applied at 50 lb., 100 lb., 200 lb. and 400 lb. per acre to transplanted onion seedlings. Measurements were made of the volatile S, and of the fresh and dry weight of the harvested bulbs. The volatile S content increased with the S applications, but the rise was less at the higher than at the lower doses. At 100 lb. per acre the average fresh weight of the bulbs was greatest. The dry matter percentage was greatest at 200 lb. per acre. Pungency, estimated by smell in samples stored for 3 months, was greatest at the 100 lb. and 200 lb. levels.

1733. Volcani, Z.
An onion and tomato disease caused by a variety of *Pseudomonas syringae*.
Bull. Res. Coun. Israel, 1954, **4**: 171-5, bibl. 4, illus.

A bacterial disease on onion leaves and tomato fruits was found for the first time in 1953 near Rehovot in Israel. The onion leaf lesions appeared as water-soaked, transparent, soft spots, 10–20 mm. in diameter, and the tomato fruit lesions appeared as small, brown, soft spots, very slightly sunken, 3–4 mm. in diameter. Inoculation experiments proved that both diseases were caused by the same organism, which was identified as a new variety of *Pseudomonas syringae*. Isolates of the fungus were also pathogenic to pepper, green lemon, grapefruit and orange fruits, tomato, potato, bean and pepper leaves, attached peduncles of tomato and pepper fruits, and slices of potato and carrot. Isolates infect plants either through or without wounds. They attack tissue at relatively low temperatures (12–14° C.) but do not cause infection at temperatures above 33° C.—Agric. Res. Stat., Rehovot.

1734. Harrison, D. E.
White rot of onions in Victoria.
J. Dep. Agric. Vict., 1954, **52**: 510-20, bibl. 5, illus.

White rot of onions, caused by *Sclerotium cepivorum*, has caused serious losses in the main onion-growing areas of Victoria. Calomel applications, with and without lime, and soil injections of chloropicrin all significantly reduced disease incidence but did not give satisfactory control. Calomel seed-pelleting showed promise in an unfinished experiment. Results of breeding for resistance have so far been disappointing.

1735. Perron, J. P., Lafrance, M., and Hudon, M.
Control of the onion maggot with insecticides.
A.R. Quebec Soc. Prot. Plants 1952, 1953, pp. 37-40, bibl. 9.

Chlorinated hydrocarbon, parathion and calomel dusts were applied on the soil surface or as seed dressings in tests on the control of the onion maggot, *Hylemyia antiqua*, at St. Jean, Quebec, in 1948/51. The best results, 81% control, were given by 5% chlordane applied three times at weekly intervals on the soil surface at 1 lb. to 300 ft. of row. It built up in the soil but caused no injury to the plants; residues on plants present little danger to man and animals. Aldrin and dieldrin were promising. Parathion gave good control, but the precautions necessary in applying it make its use impracticable.

1736. Peterson, A. G., and Noetzel, D. M.
Seed treatments compared with other methods for controlling the onion maggot.
J. econ. Ent., 1954, **47**: 852-9, bibl. 16.

In recent experiments in Minnesota heptachlor, dieldrin and aldrin applied by several methods were found effective against the onion maggot, *Hylemyia antiqua*. Pelleting onion seed with an insecticide-fungicide (thiram) mixture gave good control from planting until harvest. Dry mixes without a sticker were also satisfactory, but the limited amount of thiram that can be applied by this method may not give adequate control of smut. Broadcast applications worked into the top inch or two of soil gave results similar to those obtained with pelleted seed. Post-emergence applications of insecticides were much less effective in these experiments than the 3 methods described.

1737. Wilcox, J., and Shirck, F. H.
The onion thrips. How to control it.
Leafl. U.S. Dep. Agric. **372,** 1954, pp. 3.

Practical directions are given for controlling *Thrips tabaci* on onions by the application of 30 lb. dust per acre of 10% DDT, 20% toxaphene, 5% malathion, 2·5% heptachlor, 1·5% dieldrin or 2% parathion, or of liquid spray containing DDT (1½ lb. per acre), dieldrin (½ lb. p.a.), heptachlor (½ lb. p.a.), toxaphene (2 lb. p.a.), malathion (¾ lb. p.a.) or parathion (¼ lb. p.a.). Special treatment is described according to whether the onions are being grown for bulbs or seed.

1738. Romaniko, V. M.
A trial on the storage of onion sets. [Russian.]
Sad i Ogorod, 1954, No. 11, pp. 25-6.

In the Krasnojarsk province storage of onion sets at 12–18° C. used to result in very heavy losses. When in 1952 trials on new storage methods were started the best results were obtained with winter storage temperatures of −1 to −3° C., increased suddenly in the spring to 15–18° C., and 2–3 weeks before planting to 30–35°C.

1739. Rehm, S.
The storage of onions. Influence of maleic hydrazide on the storage quality.
Fmg S. Afr., 1954, **29**: 581-2, bibl. 3, illus.

Pre-harvest treatment of onions with MH in the Transvaal was not successful in most cases. With the Early Cape Flat variety, however, a spray of 0·2% MH applied 10–21 days before harvest resulted in complete or almost complete inhibition of sprouting for up to 6 months. This variety was not susceptible to increased rotting after treatment, even at relatively high concentrations and with early application. Texas Grano was particularly sensitive to rotting, even after late applications and low concentrations. De Wildt and Hojem were also susceptible to post-treatment rotting. Treatment with MH in the Transvaal was considered to be somewhat hazardous, owing to the uncertain weather conditions prevailing at the time for application.—Hort. Res. Stat., Pretoria.

Rhubarb.

1740. Boswell, V. R.
Rhubarb production—outdoors and in.
Leafl. U.S. Dep. Agric. **354,** 1954, pp. 6.

Growth in the quick frozen food industry has led to increased commercial interest in rhubarb in the U.S. Details are given of how to grow this cool weather perennial out of doors and under cover.

1741. Graham, T. O.
Valuable Canadian rhubarb varieties.
Market Grs' J., 1955, **84** (1): 34-5, illus.

Canada Red, Linnaeus, Victoria, Macdonald, Sunrise, The Sutton and Valentine, which is possibly the richest coloured rhubarb in the world.

Root crops.

(*See also* 1222, 1223, 1229, 1230, 1670, 1802z.)

1742. Nakamura, S.
Germination of edible burdock (*Arctium lappa* L.) seeds. II. Effect of wave length of radiation on germination. [Japanese, with English summary ¾ p.]
J. hort. Ass. Japan, 1954, **23**: 108-14, bibl. 13.

Germination of edible burdock seeds was normal under sunlight or fluorescent light but was often considerably inhibited under electric light, probably as the result of the inhibitive action of the ultra-red rays. In fluorescent or electric light germination was promoted under red or yellow paper and inhibited under blue or green, the inhibition probably being due to the ultra-red, green and blue rays reflected by the papers. Under glass filters and fluorescent light germination was promoted by waves 550–700 mμ long, somewhat inhibited by those of 400–500 mμ, extremely inhibited by those of 700–760 mμ, and slightly less extremely inhibited by those of 800 mμ and over. Similar results were obtained with *Cryptotaenia japonica* and ramie, in both of which germination is favoured by light, and also with Cucurbitaceous and Solanaceous vegetables and *Amaranthus retroflexus*, in which it is favoured by dark. The author states that in his research and that of others the germination in seeds affected by light shows about the same reaction to the wave-length of the radiation whether germination is promoted or inhibited by light, whether the light-reaction occurs in the seed-coat or the embryo, and whether the reaction diminishes with age of seed or not.

1743. Banga, O., and de Bruyn, J. W.
Selection of carrots for carotene content.
Euphytica, 1954, **3**: 203-11, bibl. 7.

The total carotenoid content of carrot roots was estimated by the Booth method. Calculations on a dry weight basis gave more representative values than using a fresh weight basis. The degree of development of the root had also to be taken into account. It is concluded that the most representative value of carotenoid content may be obtained when the amount in sufficiently coloured roots is determined before the maximum is reached, is calculated on a dry weight basis and compared with root weight expressed in grams of dry matter.—Inst. hort. Plant Breed., Wageningen.

1744. Lityński, M., and Buczakówna, E.
Doświadczenia z terminami jesiennymi i wiosennymi siewu marchwi i cebuli. **(Experiments on the time of autumn and spring seeding of carrots and onions.)**
Roczn. Nauk rol., Ser. A, 1954, **68**: 661-2.

Results of 2 years' trials indicate that under Lower Silesian conditions both carrots and onions can be successfully sown in the autumn provided the operation is carried out late in the season so that the seeds do not germinate before the winter. In the spring late seeding was also found more satisfactory than early seeding.

1745. Rusakova, A. A., and Raskin, S. E.
TMTD for treating carrot roots being grown for seed. [Russian.]
Zemledelie, 1954, **2** (8): 39-43, illus.

Dusting carrots or the layers of sand in which they are stored in the autumn with 50% tetra-methyl thiuram disulphide at 6–7 g. per kg. root gave very good control of black rot [*Alternaria radicina?*] and sclerotinia rot [*Sclerotinia sclerotiorum?*] and significantly increased seed yields. When root rots develop in spite of the control measure, re-treatment in the spring before planting out with 3–4 g. per kg. is recommended. Spring treatment alone at 7–8 g. was found less satisfactory than autumn treatment.

1746. Brown, E. B., and others.
Survey of damage by carrot fly on carrots in England and Wales, 1946-50.
Plant Path., 1954, **3**: 69-71, bibl. 2.

The only points to emerge clearly from a survey of unsprayed carrot fields are that the damage caused by *Psila rosae* to main crop carrots is apt to be considerable, and that, in general, the later these crops are sown the less the damage.

1747. Dore, J.
Studies in the regeneration of horseradish. I. A re-examination of the morphology and anatomy of regeneration.
Ann. Bot. Lond., 1955, **19**: 127-37, bibl. 21, illus.

Horseradish roots reach a stage of "ripeness to regenerate" at the age of 1–2 months, when secondary thickening has begun, a phellogen has formed, and the primary cortex has been shed, provided that they are then detached from the parent plant. New primordia arise (as is already known) only in association with the scars of lateral roots; but they are produced, not as previously believed from a callus, but individually as organized meristems whose cells are derived only from the phellogen of the main root. The primordia appear to be undetermined ("indifferent") in nature; their subsequent differentiation into buds or roots is described. [Author's abstract.]—Bot. Dep., Univ. Southampton. [See also *H.A.*, 24: 1091.]

1748. Lamm, R., and Hintze, S.
Gödslingsförsök med pepparrot. (**Manurial trials with horse-radish.**) [Summaries in English and Esperanto.]
Medd. Trädgårdsförs. **88**, 1954, pp. 10, bibl. 8.

Highest yields of horseradish were obtained by supplying one-half of the nutrient dosage as stable manure and the other half in the form of artificials. At all the pH values of the soils used in these experiments (up to 6·4) ammonium sulphate proved slightly preferable to calcium nitrate as a source of nitrogen. The trials were carried out in the Fjärås district of southern Sweden from 1944 to 1948.

1749. Collingwood, C. A., and Croxall, H. E.
Carrot fly injury and "canker" of parsnips in the West Midlands.
Plant Path., 1954, **3**: 99-103, bibl. 8.

Injury by the carrot fly, *Psila rosae*, may not be the only cause of parsnip canker, but observations and trials in the West Midlands have shown it to be a very important precursor of the disease. Where fly injury was much reduced by BHC or dieldrin there were corresponding reductions in the amount of canker present at harvest. Several fungi and bacteria were isolated from cankered roots but no one organism or group of organisms was consistently associated with the cankers.—N.A.A.S., Evesham.

1750. Stone, L. E. W.
Carrot fly and "canker" of parsnips in the South-West.
Plant Path., 1954, **3**: 118-21, bibl. 1.

Observations and trials over 5 years near Bristol have shown clearly that the rotting of the shoulders of the roots of parsnips, known as canker, is attributable to attack by larvae of the carrot fly, *Psila rosae*, and influenced subsequently by other factors, notably rainfall. All varieties tested were susceptible, though there were some differences in percentage damage between the varieties. Dusting with γ-BHC and seed dressings of γ-BHC, aldrin and dieldrin significantly reduced canker but did not, in general, give commercial control. Late sowing showed no advantage over early sowing.—N.A.A.S., Bristol.

1751. Anon.
Grondontsmetting bij de teelt van schorseneren. (**Soil sterilization in scorzonera growing.**)
Meded. Proefst. Groent. Fruit Glas Naaldwijk **13**, 1954, p. 2.

Formalin and DD were used in December, when the soil temperature was 5° C., to sterilize soil between two crops of scorzonera. In the spring the soil was dug, manured and the second crop sown. When this crop was dug in October the best results were shown by treatment with 2 litres DD applied per square "Rijnlandse roed".* After this treatment the weights of the 4 grades were as follows: 1st, 9·5 kg.; 2nd, 16·5 kg.; 3rd, 9 kg.; and 4th, 2·5 kg. In the control plot there was no 1st grade, 5·3 kg. of 2nd, 9 kg. of 3rd, and 5·4 kg. of 4th.

1752. Meyer, E.
Beobachtungen über die Drehherzmücke (*Contarinia nasturtii* Kieffer) im Dithmarscher Kohlanbaugebiet. (**Observations on the swede midge in the cabbage-growing area of Dithmarsh.**) [English summary 10 lines.]
Z. PflKrankh., 1954, **61**: 561-74, bibl. 5, illus.

In 1945 there were at least 4 generations of swede midge in Dithmarsh. The first larval generation was found only in cabbage and swede seedbeds, and the second was mainly on flowering cabbage raised for seed. Different forms of damage by the midge are described.

1753. Persson, A. R., and Vik, J.
Forsøk med skandinaviske stammer av matnepe 1951-1953. (**Trials with Scandinavian strains of garden turnip varieties 1951-53.**) [English summary 2 pp.]
Forskn. Landbruk., 1954, **5**: 579-607, bibl. 15, illus.

The trials were carried out at the Norwegian vegetable research stations of Ås and Kvithamar at latitudes of about 60° and 63° respectively.

1754. Cowley, W. R., and Wene, G. P.
Response of the yield of turnip greens to various fertilizer treatments.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 37-8.

Yields of turnip greens were increased by between 1·16 to 2·01 tons per acre with applications of 100 and 200 lb. N in the fertilizer treatments. Applications of phosphoric acid to the fertilizer mixture did not significantly increase yields. [From authors' summary.]

Salad crops.

1755. Blumenthal-Goldschmidt, S., and Stein, G.
Carotene in lettuce seeds.
Bull. Res. Coun. Israel, 1954, **4**: 84-5, bibl. 4.

It has been suggested that the mechanism responsible for the light sensitivity of germinating lettuce seeds is connected with the photochemical reactions of carotenes. Since apparently no carotenes have been isolated from lettuce seed an attempt was made to do so. The amount of carotene obtained from Grand Rapids lettuce seed by 2 methods of extraction was approximately 0·2 mg. and 0·4 mg. respectively per 100 g. seed. Although the substance could not be separated by mixed chromatography on alumina from genuine β-carotene, there are indications that it may be an isomer of β-carotene.—Hebrew Univ., Jerusalem.

1756. Hagen, C. E., Borthwick, H. A., and Hendricks, S. B.
Oxygen consumption of lettuce seed in relation to photocontrol of germination.
Bot. Gaz., 1954, **115**: 360-4, bibl. 4.

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* [Rijnlandse roed = 3·767 m.]

Seeds of lettuce variety Grand Rapids vary with duration of imbibition in their sensitivity to promotion of germination by red radiation and inhibition of germination by infrared radiation, the changes being opposite for the two effects after about 12 and 20 hours of imbibition at 20° C. Respiration changes in non-germinating seed of lettuce varieties Big Boston and Slobolt that are correlated with these changes in sensitivity to radiation also occur. Respiration of the non-germinating seed is constant during the periods between the changes in sensitivity to radiation. The relation of these phenomena to the photoreaction controlling seed germination is discussed in terms of limiting factors. [Authors' summary.]

1757. Evenari, M., and Mayer, A. M.
The effect of auxin on the germination of lettuce seeds.
Bull. Res. Coun. Israel, 1954, **4**: 81-2, bibl. 4.

Lettuce seeds, variety Grand Rapids, were germinated under varying conditions of light and temperature with and without indole-3-acetic acid (IAA). IAA had no significant effect on germination at 20° or 26° C., or when the seeds were given low temperature pre-treatment, or illuminated with red or infrared light. In experiments with non-photoblastic lettuce seeds, variety Progress, at 26° C. a high concentration of IAA, namely 10 mg. %, caused 50% inhibition. These experiments give no indication that IAA is involved in the photo-mechanism of photoblastic lettuce seeds. It is pointed out, however, that if IAA is present in optimal amounts in the seed, then any treatment with IAA would only have adverse effects.—Hebrew Univ., Jerusalem.

1758. Mayer, A. M.
Some heavy metals in lettuce seeds and changes in them during germination.
Physiol. Plant., 1954, **7**: 777-81, bibl. 4.

The mineral composition of lettuce seed was studied both before and during germination. Iron and Cu were found in larger amounts than Mn. No Mo was found. After division of the seeds into water-soluble and insoluble fractions, it was found that the percentages of soluble ash and soluble Fe increased during germination, whereas Cu and Mn remained constant.—Dep. Bot., Hebrew Univ., Jerusalem.

1759. Krickl, M.
Der Einfluss des Tageslichtes und der Temperatur auf das Wachstum der Salatpflanzen. **(Growth responses of lettuce plants to day length and temperature.)** [English, French and Spanish summaries ¼ p. each.]
Mitt. Klosterneuburg, Ser. B., 1954, **4**: 155-62, bibl. 8.

If the long-day lettuce variety Maikönig is sown in May, hardly any leaves develop and bolting occurs prematurely. Owing to the high temperatures and long days at this time of year, short-day (9 hour) treatment for 20 days immediately after emergence had not much effect on bolting, though from the end of June onwards, with decreasing natural daylength, the treatment was fully successful. The application of short-day treatment a few days after emergence, however, instead of immediately after emergence, delayed bolting even during the period of increasing daylength. At altitudes of 1,000–1,200 m. with a lower soil temperature untreated plants formed heads normally in May and June.

1760. Ullrich, J.
Untersuchungen über Salatmosaik. (Vorläufige Mitteilung.) **(A study of lettuce mosaic. Preliminary communication.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1954, **6**: 182-4, bibl. 3, illus.

Of the 28 sources of lettuce seed from 5 varieties examined, 10 were healthy and 18 infected with mosaic. It is estimated that the latter sources contained about 0·1–2·3% diseased seed, but—as observations showed—in the presence of *Myzodes persicae* the virus may soon spread over practically the whole field from only a few affected seedling plants. For this reason the author warns particularly against planting young lettuce between the rows of old lettuce or growing two lettuce crops of different ages too close to each other. The symptoms of the disease are described and illustrated. *Gomphrena globosa* and *Chenopodium urbicum* were found to be very satisfactory test plants for lettuce mosaic (75–100% infection), the period of incubation being 10–14 days.—Inst. Gemüsebau u. Unkrautforsch., Neues-Lauvenburg.

1761. Cook, J. A.
An equation describing the air cooling of lettuce heads.
Diss. Abstr., 1954, **14**: 1873, being *Publ.* 9742 of 74 pp.

An equation was formulated to describe the temperature changes in lettuce heads during cooling. The rate of cooling was not greatly affected by changes in air-speed, except when the change was a reduction to, or an increase from, 10 ft. per minute. The weight of the head had no clearly defined effect on the rate of cooling. [See also *H.A.*, 24: 2779.]

Tomatoes, capsicums and egg plants.

(*See also* 1216, 1227, 1233, 1234, 1239, 1350, 1733, 1802a, d, j, k, 1894, 2307.)

1762. Gillard, S. O.
Growing tomatoes in glasshouses.
Bull. N.Z. Dep. Agric. **370**, 1954, pp. 43, bibl. 3, illus.

In this bulletin, reproduced with slight additions from the *New Zealand Journal of Agriculture* for May and June, 1953, the author offers an authoritative, practical account of the processes involved in tomato growing under glass in New Zealand from sowing to packing.

1763. Giles, J. E.
Desirable combinations of characters in F_1 hybrid tomatoes for the glasshouse.
J. Aust. Inst. agric. Sci., 1954, **20**: 238-42, bibl. 3, illus.

Hybridization experiments with glasshouse tomatoes were conducted in the Mildura district to test whether the desirable characters of pairs of varieties could be combined together in F_1 hybrids. Two of these, South Australian Dwarf (C strain) × Vetomold and Tatinter × Vetomold, combined high yields, good growth habit, high percentages of smooth first-grade fruit, early ripening and resistance to leaf-mould. Yields of the hybrids did not differ significantly from those of the parents so that heterosis did not accompany these combinations of characters. [Author's summary.]—C.S.I.R.O., Merbein, Victoria.

1764. Turbin, N. V., Gorobec, A. M., and Narbut, S. I.
A new method of increasing the yield capacity of tomatoes. [Russian.]
Zemledelie, 1954, No. 5, pp. 114-19.

The experiments described show that inter-varietal crossing of tomatoes without previous emasculation gives rise to as much, and sometimes slightly more, heterosis as crossing after emasculation. Crossing of unemasculated flowers also resulted in better fruit set and more seeds. The progeny of unemasculated plants cross-pollinated at the beginning and middle of the flowering period were more productive than those of emasculated plants. Suitable varietal combinations for this method of hybrid seed production are given, and the use of mixed pollen is also suggested. It is recommended that pollination should be carried out with ample pollen and repeated a day or two later.

1765. Aĭzenštat, Ja. S.
The effect of length of pollen storage on hereditary influence. [Russian.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1954, No. 4, pp. 42-58, bibl. 19.

Tomato pollen stored under ordinary conditions in glass bottles or paper bags remains actively viable for 3–4 days, and pea pollen for 6–7 days. Pollination with "old" pollen leads to a considerable reduction in paternal influence on the progeny.

1766. Axelsson, F.
A new F_1-variety of tomato resistant to *Cladosporium*. [German summary 1 p.]
Agri hort. Genet., 1954, **12**: 191-201.

W: s Immuna, bred at Weibullsholm, Sweden, is an early, high-yielding tomato variety which is resistant to several strains of *Cladosporium fulvum*. Its origin is discussed and extensive data on its performance in comparison with other varieties are tabulated.

1767. Ramshorn, K.
Über den Einfluss von Hochfrequenzfeldern auf den pflanzlichen Organismus. I. Die Wirkung auf die Entwicklung von Tomatenpflanzen bei Frequenzen von 75 und 150 Mhz. **(On the influence of high-frequency fields on the plant organism. I. The effect of frequencies of 75 and 150 mega-cycles/sec. on the development of tomato plants.)**
Kulturpfl., 1953, **1**: 79-110, bibl. 38, illus. [received 1955].

Tomato seeds previously soaked for 24 hours were exposed to frequencies of 71 and 150 mega-cycles/sec. at field intensities of 58 and 45 V./cm. for periods of 1–960 seconds. Exposures of 1–8 seconds and of 60–480 seconds were found to accelerate germination without affecting the total percentage. In the case of short treatment (1–8 seconds) the plants maintained their lead through all developmental stages and yields were significantly higher than those of the controls. These results suggest that an increase in tomato yields by high-frequency treatment of the seed is a practical possibility.

1768. Artemjev, G. V.
Raising tomato seedlings within the Arctic circle at reduced day length. [Russian.]
Sad i Ogorod, 1954, No. 12, pp. 11-13, illus.

Tomato seedlings in the Arctic can be raised satisfactorily in May and June only by reducing day length. Darkening the plants in the glasshouse proved inconvenient and laborious till the development of a "short day light chamber" consisting of a lath frame, placed on the bench over plants in nutrient blocks, which is covered with some roofing material. The device is simple, easy to cover, and provides complete darkness for the required 10–12 hours per day.

1769. Gončarov, B. P., and Gudkova, M. K.
Raising tomato and cucumber seedlings under electrical illumination. [Russian.]
Sad i Ogorod, 1954, No. 9, pp. 14-19, illus.

Highest early tomato and cucumber yields were obtained when the seedlings were illuminated from incandescent 200–300 v. lamps with the light passing through a water filter. The lamps were immersed in water flowing through a glass tank, and a space of 2–3 cm. was allowed between the lamps and the bottom of the tank, thus breaking part of the infra-red radiation. The tops of the plants were 3–4 cm. below the tank. The temperature of the water in the filter should be 40° C. for tomatoes and 45–50° C. for cucumbers, and that of the air 22–25° C. for both crops. Luminescent lamps alone were less satisfactory, but in combination with small (8 v.) incandescent car lamps they gave good results. Seedlings raised with 18–20 hours daily illumination were ready for transplanting 15–20 days after emergence and were then grown under glass with or without further illumination depending on the season. Varieties suitable for treatment are given.

1770. Alvey, N. G.
Prick out early, it always pays.
Grower, 1955, **43**: 80-1.

Potentate tomato seedlings pricked out 2 days after germination weighed more after 3 weeks than seedlings of the same age pricked out later. Among January-sown seedlings those pricked out 2 days after germination generally had a significantly greater number of flowers open on the first truss at the beginning of April than those pricked out 7 days after germination. This effect was particularly marked in soil blocks. Seedlings sown at the end of April were grown on to cropping, and it was shown that early pricking out gave an overall increase of 20% in early yield, although no notable differences in total crop. In general the effect of early pricking out was greater when cultural conditions favoured rapid development.—John Innes Instn.

1771. Butters, R. E.
Tomatoes in cardboard containers.
Grower, 1955, **43**: 239-41, illus.

Ware Cross tomato plants were planted out in February into soils sterilized by steaming or formaldehyde, either in borders or in 9-in. cardboard containers with JIP 1, JIP 3, or border soil plus base fertilizer. In all treatments steamed soil gave higher yields than formaldehyde-treated soil. The use of containers gave an increase in early and total yield on both formaldehyde- and steam-treated soils. The increase in yield from using JIP 1 in containers over that of plants in borders amounted to rather more than 2 lb. per plant. The extra cost of growing in containers was estimated at 9d. per plant in JIP 1 and 4d. per plant in border soil. When plants are grown in containers greater care is needed to develop and set the first truss, and more watering may be needed.—Fernhurst.

1772. CRUCHET, P.
Comment cultiver les tomates? (**Growing tomatoes.**)
Rev. hort. suisse, 1955, **28**: 10-11.

Trials were carried out at Mont-Calme to determine the effect of pruning on fruit yield and average fruit weight in tomatoes. The varieties used were Unic and Gouden Ster, and the plants were given 3 treatments, namely single stem pruning, double stem pruning, or no pruning. Fruit was harvested earliest from single stem plants. The greatest total number of fruits was harvested from unpruned plants and they were of a more uniform colour and less liable to bursting than fruits from pruned plants. The average weight of individual fruits was less, but in general average plant yield was heavier, in unpruned than pruned plants.

1773. NICOLAISEN, W., AND FRITZ, D.
Standweitenversuche mit Tomaten im Gewächshaus. (**Research on planting distance of glasshouse tomatoes.**)
Dtsch. GartenbW., 1954, **2**: 184-6.

Tomato yields are markedly affected by plant spacing. A close planting of 75×40 cm. gave a yield from individual plants inferior to that of a 75×60 cm. spacing. The plot yield of closely-spaced plants was 25% higher than that from the wide spacing. There was no difference in fruit quality. Fruits from the close planting were slightly smaller than those from widely spaced plants.

1774. KLINKER, J. E., AND EMMERT, E. M.
Effect of foliar applications of urea, sucrose, and dextrose on tomato yields and quality.
Bull. Ky agric. Exp. Stat. **595**, 1953, pp. 29, bibl. 23.

Weekly foliar sprays of 0·1 M urea did not increase the yield of glasshouse or field tomatoes. Sugar mixed in equal molar concentrations with urea prevented marginal leaf scorch. Glycerol in urea sprays caused increased scorching. Three sprays of 0·25 M sucrose+0·25 M urea applied after 3 trusses had set were more effective in increasing yields than 6 sprays during the growing season. In a glasshouse experiment urea-sucrose sprays, with a complete soil fertilizer, significantly increased the average C content of fruits, compared with those receiving only the soil fertilizer. Tissue analyses showed that urea-sucrose and urea-dextrose sprays consistently produced significant increases in soluble N compounds compared with the unsprayed controls. Yields and petiole nitrate concentration from plants sprayed with 3 urea-sucrose sprays were comparable to those given a soil application of ammonium nitrate. An early-maturing variety, Valiant, showed increased early yields when sprayed with sucrose alone, although early yields of a later-maturing variety, Garden State, were unaffected by the spray.

1775. NOWOTNY-MIECZYŃSKA, A., AND RUSZKOWSKA, M.
Wplyw manganu stosowanego w różnych okresach rozwoju pomidorów na ich wzrost i owocowanie. (**The influence of manganese on the development of tomatoes during various stages of development.**)
Roczn. Nauk rol., Ser. A, 1954, **68**: 670-1.

Tomato plants were grown in sand culture and their response to 7·5 mg. of Mn per 1 kg. sand, applied in the form of manganese sulphate, was observed and compared with no treatment. Plants receiving no Mn developed serious deficiency symptoms, in those treated before fruit set deficiency was corrected, and when the element was applied before sowing, before flowering, or at half rates before sowing and before flowering, very satisfactory growth resulted.

1776. ANISIMOV, A. A., AND POPOVA, O. N.
The effect of phosphate nutrition of tomatoes on the quality of seed. [Russian.]
Agrobiologija, 1954, No. 5, pp. 110-11.

Superphosphate was applied to tomato plants (1) in small amounts (viz. 5 g. P_2O_5 per frame of 2 sq. m., +20 kg. per ha. basic field dressing, +15 kg. per ha. side dressing), and (2) at double these rates. Both rates improved seed quality compared with no treatment, the seed producing larger plants, earlier yields and fruits with higher sugar and vitamin C and lower acid contents. Moreover, seed from plants grown with the higher rate of phosphate produced plants that gave heavier total yields than the controls.

1777. DAVIS, D.
Benzotriazole, a plant-growth regulator.
Science, 1954, **120**: 989, bibl. 5, illus.

Benzotriazole applied to the roots of tomato plants in sand culture caused breaking of apical dominance, reduction in leaflet number per leaf, disappearance of leaf serrations, leaf cupping and petiole elongation. Changes occurred only in those leaves which developed after the treatment had started. The additional application of adenine sulphate before or of IAA at the same time as benzotriazole did not reverse the effects.—Conn. agric. Exp. Stat., New Haven.

1778. PIRINGER, A. A., AND HEINZE, P. H.
Effect of light on the formation of a pigment in the tomato fruit cuticle.
Plant Physiol., 1954, **29**: 467-72, bibl. 7.

The light-controlled production of a yellow pigment in the cuticle of fruits of the tomato variety Rutgers was studied. The yellow pigment, probably a flavenoid, was present, in fruits ripened in light, but not in those ripened in the dark. Brief daily irradiations with low-energy light early in the ripening period induced pigment formation in dark-ripened fruit. The action of red and far-red light controlling the pigment production in tomato fruits is identical with that regulating flowering in *Xanthium saccharatum* and seed germination in *Lactuca sativa* var. Grand Rapids. [See also *H.A.*, 24: 3915.]

1779. PILNIK, W., AND ROTHSCHILD, G.
Pectolytic enzymes in tomatoes.
Bull. Res. Coun. Israel, 1954, **4**: 63-5, bibl. 7.

It was shown that pectase desorbed from tomato pulp is accompanied by active pectinase. Only the pectase of the juice is free from pectinase, a fact which should be taken into consideration for the production of high-grade low-methoxy pectin. The inhibition of pectinase by a surfactant was demonstrated. Tomato pectinase was inhibited at pH 8 and 9 like fungal pectinase. The heat resistance of tomato pectinase in strong salt solution could not be confirmed.—Central Citrus Products Res. Lab., Rehovot.

1780. Petazze de Marsano, M. L. A.
Nota sobre determinación de acido ascórbico en tomates. **(Note on ascorbic acid content of tomatoes.)**
Experimenta, 1954, **1** (1): 89-90.

The ascorbic acid contents of 23 local and imported tomato varieties are given. They range from 48 mg. % in Perón to 20 in Platense.

1781. Mertens, T. R., and Burdick, A. B.
The morphology, anatomy, and genetics of a stem fasciation in *Lycopersicon esculentum*.
Amer. J. Bot., 1954, **41**: 726-32, bibl. 16, illus.

Rosette stem fasciation in tomato is characterized by flattening, swelling and striation of the axis; a rosette distribution of small, supernumerary leaves with an abnormal phyllotaxy; and a modified inflorescence of a single fasciated flower terminating the main axis. There are no seedling abnormalities, but 28–75 leaves are initiated before the first inflorescence. Ring fasciation in the rosette tomato is typified by a cavity which projects deep into the axis and opens apically to the outside. [From authors' summary.]

1782. Hill, A. V., and Mandryk, M.
A study of the virus diseases "big bud" of tomato and "yellow dwarf" of tobacco.
Aust. J. agric. Res., 1954, **5**: 617-25, bibl. 16.

The two virus diseases "big bud" of tomato and "yellow dwarf" of tobacco are transmitted by the same insect vector [*Orosius argentatus*]. Both were transmitted by grafting but not by sap inoculation. Big bud but not yellow dwarf was transmitted by dodder. *Nicotiana glauca* Graham was a symptomless carrier of both viruses. Potato was infected by big bud but not by yellow dwarf. Evidence from experiments and field observations indicates that big-bud transmission occurs during summer whereas yellow-dwarf infection can occur throughout the year. From this and other evidence (anatomical, lack of cross protective power, symptoms) it is concluded that the two diseases are caused by different viruses. [Authors' summary.]—C.S.I.R.O., Canberra.

1783. Blattný, C., and others.
Die Übertragung des Stolburvirus bei Tabak und Tomaten und seine virogeographischen Beziehungen. **(The transmission of the stolbur virus in tobacco and tomato and its virogeographical relations.)**
Phytopath. Z., 1954, **22**: 381-416, bibl. 44, illus.

The authors studied the north- and south-stolbur disease of Solanaceae and its cicada vectors in many parts of Czechoslovakia. They found the virus to be associated with diseased stands of bindweed, especially in areas climatically suited to vines. Its symptoms in solanaceous and other host plants are described and illustrated.—Biol. Inst., Acad. Sci., Prague.

1784. Couraud, —.
Traitement comparatif avec différents fongicides de l'alternariose de la tomate. **(Treatment of tomato early blight with various fungicides.)**
Terre maroc., 1955, **29**: 14-19.

Two copper and 4 organic fungicides, namely captan and 3 thiocarbamates, were compared for the control of tomato early blight (*Alternaria solani*) in a test at Aït-Melloul in 1953/54. They were applied 9 times between 20 December and 9 April. 60% zineb at 0·3 kg. per 100 l. gave the best control on the fruit (2·31% diseased compared with 27% in the control), the best control on the leaves (49% diseased compared with 87%), and by far the best yield (451 kg. per plot compared with 350 with ziram, which was next best, and 197 in the control). The organics all resulted in much better yields than the coppers. In this respect their order of merit was: zineb, manzate, captan, ziram.

1785. Schafer, L. A.
The effect of nutrition on the susceptibility of tomato, *Lycopersicum esculentum* Mill., to the early blight fungus, *Alternaria solani* (Ell. and Mart.) Jones and Grout.
Diss. Abstr., 1954, **14**: 1877, being *Publ.* 9799 of 77 pp.

Bonny Best tomato seedlings were grown in various nutrient solutions in sand culture. At 3 weeks old they were inoculated with spores of *Alternaria solani*, and infection was noted 36 hours later. P-deficient plants were most and N-deficient plants least infected. The amount of infection was not correlated with seedling size. Similar results were obtained with plants in soil receiving different fertilizer treatments. A nutrient combination of moderate to high N, P deficiency, and low to high K resulted in a high percentage infection. There appeared to be a definite relationship between N and P regarding infection susceptibility. Fungal cultures in nutrient solutions showed the greatest growth when the 3 elements were at normal or high levels. Deficiency of minor elements under these conditions did not affect fungal growth.

1786. MacNeill, B. H.
Colletotrichum root rot of greenhouse tomatoes.
Plant Dis. Reptr, 1955, **39**: 45-6, bibl. 1.

Colletotrichum atramentarium has been regularly isolated from the roots of greenhouse tomatoes affected by a sporadic, though sometimes severe, root rot disease in southern Ontario. Infection trials have shown that the fungus can destroy the roots not only of young seedlings but also of plants 8 or 12 weeks old. Effective control has been obtained by steam sterilization of infested soil or by fumigating it with Dowfume MC-2 (methyl bromide 97·5%, chloropicrin 2·0%) at a rate of about 4 lb. per 100 cu. ft. of soil.—Ontario agric. Coll., Guelph.

1787. Naef-Roth, S., and Reusser, P.
Über die Wirkung der Fusarinsäure auf den Gaswechsel von Tomaten-Blattgewebe. **(The action of fusarinic acid on gaseous exchange in tomato leaf tissue.)**
Phytopath. Z., 1954, **22**: 281-7, bibl. 7.

The toxic agent formed in tomato plants after infection with *Fusarium lycopersici* is fusarinic acid (5 n-butyl picolinic acid). This toxin has an inhibitory effect on the respiration of tomato leaf tissue, the degree of inhibition depending on the pH of the medium. Oxygen uptake and CO_2 output are inhibited to a similar extent. Picolinic acid has an equally inhibitory action on tomato leaf tissue respiration.—Eidg. Technische Hochschule, Zürich.

1788. Jaenichen, H., and Heimann, M.
Untersuchungen über die Wirkung des Chinosols (8-Oxychinolinsulfat) auf verschiedene parasitische bodenbewohnende Pilze. **(The action of quinosols (8-oxyquinolinsulphate) on several parasitic soil fungi.)**
Gartenbauwiss., 1954, **19**: 218-38, bibl. 25, illus.

Experiments showed that quinosol had an inhibiting and sometimes curative effect against *Rhizoctonia* sp. in tomato seedlings, against *Thielavia basicola* in *Kalanchoë blossfeldiana*, and against *Fusarium*-wilt of cucumbers. It did not control *Verticillium albo-atrum* in *Kalanchoë*. Satisfactory soil sterilization was obtained by rates of 0·05%, though 0·01% was more effective with *Kalanchoë*. Concentrations of 0·1% had phytotoxic effects on the experimental plants.—Inst. für PflKrankh. und PflSch., Hannover-Herrenhausen.

1789. Walker, J. C., and others.
Relation of plant nutrition to disease development. VIII. Verticillium wilt of tomato.
Amer. J. Bot., 1954, **41**: 760-2, bibl. 5.

Young tomato plants were grown for 25–40 days in drip-sand culture at various levels of balanced nutrient concentration, and with nutrient solutions of high and low levels of N, P, and K. In general the rate of Verticillium disease development increased with nutrient concentration. In the low N series there was a retardation in disease development.—Univ. Wisconsin. [From authors' summary.]

1790. Wilson, K. S.
The fate of *Verticillium albo-atrum* R. and B. in muck soil as affected by various species of fungi.
Diss. Abstr., 1954, **14**: 1516, being *Publ.* 9387 of 134 pp.

Muck soil was most effectively sterilized by steam under pressure and intermittent steam methods. Eight antibiotics were tested at 3 concentrations against *Verticillium albo-atrum*. Rimocidin and chloromycetin were the most effective against 3 isolates. There were indications that *V. albo-atrum* was a poor competitor among soil flora. In greenhouse tests rimocidin reduced disease incidence in tomatoes, caused by *V. albo-atrum* No. 9. Rimocidin was stable in muck soil, and was not phytotoxic at 10 mcg./ml. At this concentration it gave control in 63% of the cases. Trials with 16 antagonistic fungi suggested that the pathological effects of *V. albo-atrum* No. 9 to tomatoes might be modified. *Streptomyces* W-32, *Fimetaria* sp., *Podospora* sp., *Chaetomium* sp. and *Stachybotrys alternans* effected complete inhibition of this isolate from tomato.

1791. Michelbacher, A. E., and Middlekauff, W. W.
Vinegar fly investigations in Northern California.
J. econ. Ent., 1954, **47**: 917-22, bibl. 4.

The habits and control of vinegar fly, *Drosophila melanogaster*, were studied in tomato fields. The most serious infestations were found in regions of large fruit plantings, and it is believed they were the result of the migration of the flies from peach orchards which had been harvested earlier. Low light intensities, temperatures above 13° C. and calm weather were necessary for maximum activity of adult flies. In control trials dieldrin, applied by aeroplane at 1 lb. per acre in 10 gal., showed most promise. A 10% Q-137 dust and a malathion-sugar spray, both applied by hand equipment, also warrant further testing.

1792. Tanada, Y., and Holdaway, F. G.
Feeding habits of the tomato bug, *Cyrtopeltis (Engytatus) modestus* (Distant), with special reference to the feeding lesion on tomato.
Tech. Bull. Hawaii agric. Exp. Stat. **24**, 1954, pp. 40, bibl. 91, illus.

The feeding lesion of the tomato bug on tomato plants is the result of numerous feeding punctures made in a ring round the stem. The insect feeds mainly on young shoots and flowers, and in the field was more numerous on plants with higher N content than on those with lower N content. The bug is effectively controlled by DDT.

1793. Leiderman, L.
Ação dos modernos insecticidas contra a "broca pequena do fruto do tomateiro". **(Effect of modern insecticides on *Neoleucinodes elegantalis*.)**
Biológico, 1954, **20**: 158-61, bibl. 4.

Emulsifiable parathion, applied weekly at 0·04% from shortly after fruit set, gave the best result of 16 insecticides tested against *Neoleucinodes elegantalis* on Santa Cruz tomatoes, namely 7% infested fruit compared with 21% in the control. Lindane, dieldrin, DDT, EPN-100 and isodrin were promising.

1794. Brown, E. B.
Springtail damage to tomatoes.
Plant Path., 1954, **3**: 87-8, bibl. 2, illus.

A case is recorded in which tomato seedlings growing in 3-inch pots under glass were seriously retarded and in many cases killed by springtails of 3 species, *Onychiurus stachianus*, *O. nemoratus* and *Anurida granaria*. The insects gained entry through the holes in the bottoms of the pots, which, contrary to normal practice, were placed directly on the soil surface of the propagating house. Among various control measures tried, BHC wireworm dust applied to the soil surface at ½ oz. per sq. yd. was effective, as also was 0·00625% γ-BHC applied around the edges of the pots at 2 fl. oz. per pot.—N.A.A.S., Cambridge.

1795. Piovano, A. P., and Melis, L. O.
Variedades comerciales de pimientos. **(Commercial varieties of sweet and red pepper.)**
Experimenta, 1954, **1** (1): 59-87, bibl. 41, illus.

Notes are given on some 37 varieties of *Capsicum* *annuum* and *C. frutescens*, about half of them originating from the United States, grown in Argentina for fresh consumption or processing.

1796. Lutes, D. D.
Inheritance of resistance to systemic tobacco mosaic infection in pepper [*Capsicum frutescens*].
Diss. Abstr., 1954, **14**: 1900, being *Publ.* 9188 of 107 pp.

In red pepper the symptoms of 4 different reaction types to tobacco mosaic virus were studied. Only 2 selections from a breeding programme for resistance were considered to be of commercial promise. Their progeny showed complete resistance to systemic virus infection, and were superior to Californian Wonder in rate and percentage of seed germination, initial growth rate and earliness of flowering and fruiting; they were equal to this variety in fruit quality and slightly inferior in fruit quantity.

1797. Sleeth, B.
Damping-off control in peppers.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 43-5.

Emergence losses of pepper seedlings, Rio Wonder, were only slightly reduced by fungicidal seed treatment with Dithane Z-78, Arasan, and phenyl mercuric salicylate. Three applications of Dithane Z-78 as a drench were effective in reducing seedling losses from 51% to 24·7%. Seedling losses were 50% higher in boxes filled with dry summer-fallowed soil than in soil that had been pre-irrigated for 2–3 weeks before planting.

1798. Bremer, H.
Beobachtungen zur Wurzelfaule im Trokkenklima. **(Observations on root rot in dry climates.)**
Z. PflKrankh., 1954, **61**: 575-87, bibl. 32, illus.

A root rot was observed on some crop plants originating from a humid climate and growing under irrigation in semi-arid conditions near Ankara (Central Anatolia). The crops affected included peppers (*Capsicum annuum*) and eggplants, but tomatoes were not affected. The plants began to wilt in the hottest part of the summer and eventually wilting became irreversible. *Fusarium* spp., *Cylindrocarpon, Macrophomina phaseoli* and *Colletotrichum atramentarium* were most frequently isolated from roots of diseased plants.

1799. Wene, G. P., Gausman, H. W., and Cowley, W. R.
Effect of salt content of irrigation water on the growth of pepper and the magnitude of the serpentine leaf miner infestation.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 28-9, bibl. 2.

Irrigation by well water containing 2,400–2,700 p.p.m. salt, and by river water containing 420–600 p.p.m. salt was applied to pepper seedlings. The serpentine leaf miner (*Liriomyza subpusilla*) infested the same numbers of leaves per plant in both plots, but there was a lower percentage of infestation in plants irrigated with river water owing to the greater number of leaves produced. It is concluded that the high salt content of irrigation water is a greater factor in stunting pepper seedling growth than is the serpentine leaf miner.

1800. Krishnamurthi, S., and Subramanian, D.
Some investigations on the types of flowers in brinjal (*Solanum melongena*), based on style length, and their fruit-set under natural conditions and in response to 2,4-dichlorophenoxy acetic acid as a plant growth-regulator.
Indian J. Hort., 1954, **11**: 63-7, bibl. 3.

An examination of 1,451 flowers of the Long Black variety of eggplant showed 39·4% to be true short-styled, 7·8% pseudo short-styled, 5·7% medium-styled and 47·6% long-styled. Under natural conditions 27% of the flowers set fruit, but 93% of these came from long-styled flowers and none at all from either the true or pseudo short-styled flowers. The application of 2,4-D as a paste at 0·0025–0·01% or as a water spray at 0·0005% increased fruit set as a whole to 50–60%. The true short-styled flowers still remained sterile, but the pseudo short-styled flowers set fruit up to 66% and the medium and long-styled flowers up to 100%.—Dep. Agric., Annamalai Univ., Annamalainagar.

1801. Banerjee, S. N., and Basu, A.
On the control of brinjal stem and fruit borer, *Leucinodes orbonalis* Guen., in West Bengal.
Sci. and Cult., 1955, **20**: 350-1, bibl. 1.

In trials in 1953/54 on the control of *Leucinodes orbonalis* on eggplant 3 levels of DDT were sprayed on three times at fortnightly intervals beginning in the last week of December. The highest level, 1%, gave the best result, namely, 19% damaged fruit compared with 64% in the control.

Noted.

1802.

a Beattie, J. H.
Production of eggplant.
Leafl. U.S. Dep. Agric. **131**, 1947, pp. 4.

b Combe, I., and Suárez G., L.
Susceptibilidad y resistencia de diversos cultivos al ataque del nematode, *Heterodera marioni.* (Susceptibility and resistance of **of certain crops to the nematode *Heterodera marioni.*)**
Bol. trimestr. Exp. agropec. Lima, 1954, 3 (2): 9-12.
Cucumber, pumpkin and *Cannabis sativa* were very susceptible.

c Edson, S. N., and Smith, F. B.
Soils and fertilizers for Florida vegetable and field crops.
Bull. Univ. Fla agric. Exp. Stats **514**, 1953, pp. 23, map [received 1955].
Vegetables and strawberries.

d Falk, K., and Myrstad, A.
Sortforsøk med veksthustomat 1954. **(Variety trials with glasshouse tomatoes 1954.)**
Gartneryket, 1954, **44**: 859-60.

e GILLARD, S. O.
Commercial growing and storing of pumpkins and squash.
Bull. N.Z. Dep. Agric. **369**, [1954?], pp. 9, illus.

f GREBENŠČIKOV, I.
Die Entwicklung der Melonensystematik. (Ein Beitrag zur Systematik der Kulturpflanzen.) **(Taxonomy of melons. A contribution to the taxonomy of cultivated plants.)**
Kulturpfl., 1953, **1**: 121-38, bibl. 43 [received 1955].

g HANISCH, H.
Übersicht über die Gemüse- und Blumenzüchtung Österreichs. **(A survey of Austrian vegetable and flower breeding.)**
Ber. Bundesanst. alpine Landw. Admont, Arbeitstagung 1954, 1954, pp. 290-323.

h VAN HOOF, H. A.
Verschillen in de overdracht van het bloemkoolmozaiekvirus bij *Myzus persicae* Sulzer en *Brevicoryne brassicae* L. **(Differences in the transmission of cauliflower mosaic virus by *Myzus persicae* and *Brevicoryne brassicae*.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1954, **60**: 267-72, bibl. 6.

i HURNDELL, L. C.
An improved asparagus variety in Canterbury.
N.Z. J. Agric., 1954, **89**: 623-5, illus.
K.B.F. raised in England by A. W. Kidner, and culture.

j KRUŽILIN, A. S., AND ERVALJD, M. A.
Characteristics of phasic development and growth of sweet pepper and eggplant. [Russian.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1954, No. 4, pp. 28-34, bibl. 9, illus.
For a similar account see *H.A.*, 25: 694.

k LANGVAD, B.
Tomatsorten "One & One" i ett års prøvedyrking ved Grønsakforsøka, N.L.H. **(The tomato variety One & One in one year's tests in the Vegetable Trials at the Norwegian College of Agriculture.)**
Gartneryrket, 1954, **44**: 795-6.

l LEGERSTEE, C. J.
De teelt en de invoer van uien in het Verenigd Koninkrijk. **(Growing and importing onions in the United Kingdom.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1954, **17**: 961-72, 986, illus.
From the Dutch point of view.

m LEHMANN, C. O.
Das morphologische System der Saaterbsen (*Pisum sativum* L. sens. lat. Gov. ssp. *sativum*). **(The morphological system of *Pisum sativum*.)**
Züchter, 1954, **24**: 316-37, bibl. 18, illus.
Taxonomy.

n MARSH, A. W.
Moisture control for vegetable irrigators.
Market Grs' J., 1955, **84** (1): 20-1, illus.
Notes on soil moisture measuring with a soil auger, tensiometers and resistance meters.

o MINISTRY OF AGRICULTURE, LONDON.
Cloche cultivation.
Adv. Leafl. Minist. Agric. Lond. **375**, revised 1954, pp. 7.
Vegetables and a note on flowers.

p MINISTRY OF AGRICULTURE, LONDON.
Black bean aphid.
Adv. Leafl. Minist. Agric. Lond. **54**, revised 1954, pp. 5, illus.
Aphis fabae.

q NEW SOUTH WALES DEPARTMENT OF AGRICULTURE.
Soil acidity and the growth of vegetables.
Agric. Gaz. N.S.W., 1954, **65**: 494-6.
The optimum pH ranges for several vegetables listed.

r NORTH, C.
Vegetables to suit the Scottish climate.
Grower, 1954, **42**: 1039-40.

s RAMOS, A. H.
Cauliflower growing in San Leonardo, Neuva Ecija.
Philipp. J. Agric., 1953, **18**: 139-43.

t ROBERTSON, J. K.
The growing of canning beans in Tanganyika.
World Crops, 1955, **7**: 23-5, illus.
White haricot types.

u SCHWANITZ, F.
Über somatische Mutationen der Zellgrösse bei Grünkohl und ihren Einfluss auf Form und Qualität. **(On somatic mutations of cell size in kale and their influence on shape and quality.)**
Züchter, 1955, **25**: 26-33, bibl. 3, illus.
The mutations resulted in more pronounced curling in slightly curled leaves.

v STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Sortsforsøg med lave marværter 1950-52. **(Dwarf pea variety trials 1950-52.)**
Tidsskr. Planteavl, 1954, **57**: 721-2.

w STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Sorts- og stammeforsøg med pickles- og sylteagurker, 1951-1953. **(Trials with varieties and strains of pickling cucumbers, 1951-1953.)**
Tidsskr. Planteavl, 1954, **57**: 723-6.

x THOMPSON, R. C.
Asparagus culture.
Fmrs' Bull. U.S. Dep. Agric. **1646**, revised 1954, pp. 22, illus.

y WINSLOW, R. D.
Provisional lists of host plants of some root eelworms (*Heterodera* spp.).
Ann. appl. Biol., 1954, **41**: 591-605, bibl. 12.
Including vegetables, flowers and hops.

z YAMAGUCHI, M., ROBINSON, B., AND MACGILLIVRAY, J. H.
Food value tests with carrots.
Calif. Agric., 1954, **8** (12): 4, 10.
For another account see *H.A.*, 23: 3132.

TOBACCO.

General.

(*See also* 1182, 1187, 1231, 1237, 1240, 1618, 1619, 1836c, k, m, n, 1886, 2287, 2288.)

1803. TOBACCO RESEARCH STATION AND CAWTHRON INSTITUTE.
Tobacco Research Annual Report for 1953-54, Motueka, N.Z., pp. 2.

Weed control was achieved in seedling beds by methyl bromide at 1 lb. per 100 sq. ft. of bed or by chlorobromopropene applied as a drench. Boron deficiency yielded to the application of 5 lb. boron per acre. A copper deficiency resulted in leaf breakdown and was found curable by the application of 50 lb. bluestone per acre. Aldrin mixed with magnesite controlled wireworms and cutworms. Selection and breeding for resistance to black root rot and mosaic are reported. Kiln experiments continue. Disease work has concerned black root rot, verticillium disease and phytophthora canker. The effects of different fertilizer applications and of cover cropping on the composition of leaf are being examined. Acreage under tobacco in New Zealand fell from 3,514 in 1952/53 to 3,212 in 1953/54.

Varieties.

(*See also* 1836f, l, 2299, 2301.)

1804. GUTIERREZ, M. E.
II. Botanical descriptions of tobacco varieties grown at the Central Experiment Station, Manila (1951-1952 season).
Philipp. J. Agric., 1953 (issued 1954), **18**: 45-73, bibl. 2, illus.

The 32 varieties described include filler, binder, wrapper and aromatic (Virginia, white Burley, Maryland, Turkish and pipe) types.

1805. TUGADE, P. P.
The Simmaba tobacco, its origin and contribution to the Philippine tobacco industry.
Philipp. J. Agric., 1953 (issued 1954), **18**: 75-83.

Simmaba is a wilt-resistant variety bred in the Philippines in the early 30's and now widely grown there.

Sowing, planting and cultural treatment.

(*See also* 1836d, e.)

1806. THOMSON, R.
Raising tobacco plants from seed.
N.Z. J. Agric., 1954, **89**: 489-96, illus.

The author describes methods developed by the Umukuri Research Station, and used successfully by growers. Less mosaic infection through handling is likely when growers raise their own plants from seed.

1807. HUNTER, J. G.
Some features of seedbed management.
Rhod. Tobacco, 1954, No. 6, pp. 3-4.

Advice is given on transplanting size, "storing" standard sized seedlings in the bed for 3 weeks by clipping the leaves just above the bud, NPK fertilizing, watering, and selective pulling for planting out.

1808. RHODESIA TOBACCO ASSOCIATION.
A mechanical planter in use at Kutsaga.
Rhod. Tobacco, 1954, No. 6, pp. 5.

Four photographs are reproduced of a mechanical planter drawn by a light tractor and operated by 2 men. In addition to planting, it applies fertilizer in 2 bands 8 in. apart and supplies water to each planting hole.

1809. HUNTER, J. G.
Topping and suckering.
Rhod. Tobacco, 1954, No. 7, pp. 6-7.

Topping and suckering experiments made at Trelawney Research Station in 1953/54 are reported. In a topping time trial topping was done when (1) 10% and (2) 90% of the plants were in bloom and (3) by a fractional method whereby plants were topped whenever they flowered until 60% had been topped, at which stage the remainder were topped all together, whether they had flowered or not. Yields were similar with the 10% (the standard time) and the 90% treatments, namely 986 and 1,002 lb. per acre respectively, but the former gave the better quality, namely 49·0 grade index compared with 46·1. Late topping gave the lowest yield and quality. In a topping height trial topping took place at the standard height, i.e. a point where the uppermost leaf is about 3 in. broad, and at 3 in. above and below this point. The standard position gave intermediate yield and quality (951 lb. and 46·0 grade index), the high position the greatest yield and lowest quality (1,022 lb. and 45·6) and the low position the smallest yield and highest quality (887 lb. and 48·0). In a suckering method trial there was no significant difference in yield or quality between the following 3 treatments: (1) by hand, all removed, (2) by hand until only 6 leaves remained unreaped, and (3) by oil emulsion.

1810. McDONALD, I.
Progress report on rotation experiments.
Rhod. Tobacco, 1954, No. 6, pp. 9-11, illus.

Interim results of rotation experiments in progress at Trelawney and Kutsaga Research Stations suggest that on normal sandveld the best crop for a 2-year rotation is munga, *Pennisetum typhoides*, sown at 14 lb. per acre, fertilized with 30 lb. N as sulphate of ammonia and 30 lb. P_2O_5 as superphosphate and ploughed in at full head without the application of extra N. The tobacco should be fertilized with 10–20 lb. N per acre in addition to the normal amounts of P and K.

1811. GARMANY, H. F. M.
Plough deep and early for higher yields.
Rhod. Tobacco, 1954, No. 6, pp. 13-14, illus.

In recent ploughing tests at Kutsaga Research Station the average yield of flue-cured tobacco from 3 deep ploughing treatments was 300 lb. per acre more than that from 3 shallower ploughing treatments. Of the 6 treatments disc ploughing at 6 in. followed by subsoiling 20 in. deep along the rows gave the best yield, namely 1,758 lb. per acre. There was little difference in quality in the tobacco resulting from the various treatments. In an experiment on the time of ploughing in munga, *Pennisetum typhoides*, ploughing in in February, April and September gave yields of 1,601, 1,333 and 1,257 lb. per acre respectively.

Fertilizers.

1812. McCants, C. B., and Woltz, W. G.
Urea and calcium cyanamide in tobacco plant beds.
Tech. Bull. N.C. agric. Exp. Stat. **105**, 1954, pp. 31, bibl. 36.

Source and rate of N. N remaining in the soil from the combination autumn fertilizer treatment sufficed at seeding time. On beds untreated in autumn with urea and calcium cyanamide urea proved the best source of nitrogen in the fertilizer given at seed time. In most cases cottonseed meali n the fertilizer, when used at high rates following autumn treatment with urea and calcium cyanamide, resulted in decreased plant stand and fewer transplantable seedlings. *P and K.* Autumn application of P and K at the time of application of urea and cyanamide, especially when all was mixed together, gave good weed control and enhanced plant production. *Urea and cyanamide in plant beds.* The maximum pH of the soil for each treatment was reached within 1 week of application. In urea-treated soils this rapid increase was followed by a slow decrease till after about 100 days, when, at time of seeding, the pH was at about its original level. About 75% of the cyanamide N disappeared in the first two weeks after application. At seeding, 95 days later, a significant amount of the residual cyanamide N was still in the soil. *Soils treated with 1, 2 or 3 annual doses of urea and/or calcium cyanamide.* The continuous use of the uramon treatment had little effect on the soil properties studied. Cyanamide and the combination treatment resulted in increased soil pH and exchangeable Ca and decreased exchangeable hydrogen. Maximum pH and maximum Ca saturation were reached after the 2nd application. The cyanamide treatment resulted in higher pH and exchangeable calcium than did the combination treatment. The exchangeable Mg and K were little, if at all, affected by these treatments. The trials, carried out at the McCullers Experiment Station near Raleigh and at the Upper Coastal Plain Station near Rocky Mount, are described in considerable detail.

1813. Clark, F.
Fertilizer tests with flue-cured tobacco.
Bull. Fla agric. Exp. Stats **512,** 1953, pp. 27, illus.

Fertilizer tests were carried out on fine sand near Gainesville during the period 1939–44. N stimulated growth more than any other element. The optimum rate of N was found to be 30 lb. per acre. Heavy rates of N must be balanced with P to ensure ripening, and K must be increased to maintain quality. Single source applications of N were not so good as a combination of sources, and the best results came from a combination of sulphate of ammonia, sodium nitrate and urea. It was shown that fertilizers high in organic N are not necessary for the production of good yield and quality. Small increases in yield and grade were obtained from P_2O_5 up to 80 lb. per acre. Higher rates reduced yields slightly. Rates of K_2O may be economically increased from 60 up to at least 110 lb. per acre. Higher rates delayed flowering. Eighty lb. CaO and 20 lb. MgO appeared to be adequate for good yield and quality. No response to SO_3 was observed, except a slight increase in yield from high rates of S combined with equally high rates of K. A fertilizer containing 20 lb. Cl was better than one containing none or another containing 40 lb. Other minor elements were not significantly beneficial. There was a steady increase in yield from fertilizers up to 1,800 lb. of 3-8-6 per acre. Recommendations are made concerning source of fertilizers and methods of application.

1814. Garmany, H. F. M.
Magnesium deficiency in Southern Rhodesia.
Rhod. Tobacco, 1954, No. 7, p. 11.

Serious magnesium deficiency has been observed in tobacco crops at Trelawney and Kutsaga Research Stations and elsewhere in Southern Rhodesia. The deficiency is more pronounced in light soils, especially in seasons of heavy rainfall. As a precaution 20 lb. MgO per acre may be applied at, or within 3 weeks of, planting as magnesite, dolomite or epsom salts.

1815. Krishnamoorthy, T., Awatramani, N. A., and Kadam, B. S.
Nitrogenous manuring, spacing, and topping of bidi tobacco in Gujerat.
Indian Tobacco, 1954, **4:** 124-38, bibl. 6.

Two experiments, one on manuring alone and the other on manuring, plant population and number of leaves per plant, were conducted for three seasons, from 1948/49 to 1950/51, at the Bidi Tobacco Research Station, Anand. In the first experiment in a light soil, groundnut and castor cakes were compared with farmyard manure at 0, 40, 80 and 120 lb. N per acre. Yields of cured leaf were significantly higher after oil-cake treatments and increases due to increase of N were also significant. In the second experiment in a medium soil, N levels up to 160 lb. per acre, plant populations of 4,840, 5,808 and 7,260 per acre and 8, 11 and 14 leaves per plant were tried. Yields of cured leaf increased significantly with increases in N and in number of leaves. Differences due to population, however, were comparatively small and not significant. Quality of leaf improved with increase of N and decrease of population and number of leaves. The results of the two experiments are discussed with reference to the differences in seasonal and soil conditions. It is concluded that the optimum combination for yield, quality and early maturity should be about 4,840 plants per acre, 80 to 160 lb. N per acre as oil-cake and 8 to 11 leaves per plant depending upon soil and seasonal conditions. [From authors' summary.]

1816. Hunter, J. G.
Nickel toxicity in a southern Rhodesian soil.
S. Afr. J. Sci., 1954, **51**: 133-5, bibl. 25, illus.

Soils derived from serpentine rock in the Great Dyke of S. Rhodesia are generally infertile. Analyses showed that these soils contained abnormally high levels of both acetic-soluble and exchangeable Ni. The Ni content decreased with soil depth. The Ni content of indicator plants was relatively high. Tobacco plants can be affected by Ni toxicity. Very young tobacco seedlings grown in soil from the 0–9 in. layer developed extensive brown necrosis and many died. Older seedlings in sand culture were very seriously affected by a nutrient solution containing 2·5 p.p.m. Ni; a prominent interveinal chlorosis appeared in all leaves and this was quickly followed by extensive brown necrosis and severe growth restriction. Corrective measures recommended are liming and application of N and K fertilizers [see *H.A.*, 23: 2484].—Trelawney Tobacco Res. Stat., Salisbury.

Hail damage.

1817. Wingfield, N.
The havoc hail can cause and how to combat it.
Rhod. Tobacco, 1954, No. 6, pp. 6-7.

If damaged by hail in the early stages of growth tobacco should be severely primed to the bud or, if the bud has been injured, cut back. If damage occurs at or after the topping stage, as much as possible of the leaf should be salvaged and the crop should then be desuckered, the top sucker being left.

Diseases.

(*See also* 1782, 1783, 1796, 1836a, i.)

1818. Ryžkov, V. L., and Marčenko, N. K.
The effect of some metabolites on the reproduction of tobacco mosaic virus. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **98**: 1033-6, bibl. 14.

The effect was studied of some acids and vitamins on the reproduction of TMV in leaves of *Nicotiana glutinosa*. Oxalic and malonic acids and thiamin reduced significantly the number of necrotic lesions produced. A statistical analysis is presented of the results obtained and possible practical implications of these findings are noted.

1819. Vayonis, G. C.
Phosphorus disturbances in mosaic-virus infected tobacco plants.
Physiol. Plant., 1954, **7**: 687-97, bibl. 22.

Inorganic phosphorus, phosphate esters and residual plus total P were studied in healthy and mosaic-infected tobacco plants. Inorganic and total P decreased in infected plants 6 days after inoculation, when secondary symptoms were well established. Residual P gave inconsistent results for different leaves throughout establishment of the disease. Phosphate esters were markedly increased during the first hours up to the second day after inoculation in all young leaves. This was followed by a decrease of phosphate esters reaching a minimum about 4 days after inoculation. By the time secondary symptoms had appeared, phosphate esters were far above those of the control.—Dep. Bot., Mich. State Coll.

1820. Basler, E., Jr.
Relations between the nucleic acids of tobacco leaf and the biosynthesis of tobacco mosaic virus.
Diss. Abstr., 1954, **14**: 1509-10, being *Publ.* 8958 of 99 pp.

The major nucleoproteins of the tobacco plant were isolated and partially fractionated. Virus infection of healthy tissue caused an accumulation of excess nucleic acid very soon after inoculation, but this excess disappeared with the appearance of new virus. The use of isotopic N^{15} indicated that most of the nucleic acid appearing in tobacco mosaic virus was synthesized soon after host inoculation. There was evidence of heterogeneity of nucleic acid found in tobacco mosaic virus.

1821. Benda, G. T. A., and Naylor, A. W.
On the tobacco ringspot disease. 1. Localization of recovery.
Amer. J. Bot., 1954, **41**: 799-803, bibl. 11.

The general problem of the recovery of Turkish tobacco from the ringspot virus disease is the elucidation of the mechanism whereby leaves in certain stages of the disease will react with necrotic symptoms to the presence of the virus, while in a later stage no symptoms are formed on newly produced leaves, even though the virus is present. This investigation considered the question of the localization of the mechanism of recovery in relation to the parts of the plant. Recovered leaves remained symptomless when grafted into healthy stems or when grown as cuttings. When healthy leaves were grafted into recovered plants, however, they developed symptoms. Axillary buds of recovered plants when budded into healthy stock produced symptomless shoots, while the axillary shoots of the stock developed typical symptoms. In one case, an adventitious bud developing from a recovered leaf showed symptoms. Different shoots of one diseased plant do not necessarily recover simultaneously. A discussion of these and other observations lead to the conclusion that the mechanism of recovery of a leaf is within that leaf. [Authors' summary.]—Univ. Calif., Berkeley, and Duke Univ., Durham, N.C.

1822. Kirby, R. S.
Control of tobacco wildfire with streptomycin preparations.
Beach, W. S., and Engle, H. B.
Tobacco wildfire control by streptomycin nitrate.
Plant Dis. Reptr, 1955, **39**: 14 and 15-16, illus.

The first paper records the successful use of sprays of 100 or 200 p.p.m. Agrimycin (streptomycin sulphate 15%+terramycin 1·5%) plus ferbam at 3 lb. per 100 gal. to control wildfire (*Pseudomonas tabaci*) in tobacco seedbeds. Four weekly spray applications were effective both as preventive treatments and in cases where from 5 to 50% of the plants had already become infected.—Pa St. Univ.

The second paper records a similar success for the use of streptomycin nitrate applied at a rate equivalent to 100 p.p.m. streptomycin to seedlings inoculated with a virulent culture of *P. tabaci*.—Pa agric. Exp. Stat.

1823. Clayton, E. E., and Grosso, J. J.
Tobacco blue mold control with zineb dusts.
Plant Dis. Reptr, 1954, **38**: 771-3.

A 10% commercial zineb-tobacco dust was compared with a 10% zineb-pyrophyllite mixture in the control of tobacco blue mould (*Peronospora tabacina*). The zineb-tobacco dust gave relatively poor control, but the zineb-pyrophyllite dust gave good control. Both gave good control when applied as a spray. The efficiency of the zineb-tobacco dust was improved by adding extra zineb, but even a 20% zineb-tobacco dust gave inferior mould control to the 10% zineb-pyrophyllite dust.

1824. Oberthür, K.
Über die Anfälligkeit verschiedener Tabak-Arten, -Sorten und- Zuchtstämme gegen *Thielavia basicola* (B. et Br.) Zopf. **(On the susceptibility of different tobacco species, varieties and strains to *Thielavia basicola*.)**
Züchter, 1955, **25**: 17-26, bibl. 24, illus.

All *Nicotiana rustica* varieties tested proved resistant to black root rot, while all *N. tabacum* varieties were susceptible, though in different degrees. The results obtained in these trials encourage the hope that it will be possible to breed smoking tobacco varieties which are largely resistant to the fungus under German conditions. Symptoms of the disease are illustrated.—Inst. f. Tabakforsch. Wohlsdorf-Biendorf (Anh.).

Pests.

1825. Edwards, B. A. B.
Control of tobacco pests in W[estern] A[ustralia].
J. Agric. W. Aust., 1954, **3**: 449-50, illus.

The insects commonly attacking tobacco plants are the leaf miner, stem borer, cutworms, loopers, grasshoppers and wireworms. Most of these can be controlled by DDT as a 0·1% spray or as a 2% dust.

1826. Lawson, F. R., Lucas, G. B., and Hall, N. S.
Translocation of radioactive phosphorus injected by the green peach aphid into tobacco plants.
J. econ. Ent., 1954, **47**: 749-52, bibl. 9, illus.

The green peach aphid, *Myzus persicae*, has recently become an important pest of tobacco in the United States. The injury it causes is briefly described. In experiments at Oxford, North Carolina, aphids fed on tobacco plants treated with P^{32} became radioactive. The tracer was also found in leaves of untreated plants onto which the aphids were transferred to feed. The P^{32} inserted into the leaf by the aphids was translocated to other parts of the plant. It is concluded that part of the injury caused by aphids may be due to injected salivary secretions absorbed and translocated by the plant.

1827. Oberthür, K.
Die Wiesenwanze (Lygus pratensis L.) als Tabakschädling. **(The tarnished plant bug as a pest of tobacco.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1954, **8**: 229-33, bibl. 9, illus.

Observations in Germany in 1954 showed that the tarnished plant bug causes widespread damage to the growing point and foliage of young tobacco plants. Mechanical injury and toxic action of the saliva combine to produce symptoms which are described and illustrated. The bug deserves attention also as a virus vector. The search has begun for insecticides which will control the pest without affecting tobacco quality.—Biol. Zentralanst., Berlin, Zweigstelle Erfurt.

1828. Stahl, C. F.
Trapping hornworm moths.
J. econ. Ent., 1954, **47**: 879-82, bibl. 3, illus.

Field studies indicated that the use of either bait or light traps had little effect on the abundance of, and damage caused by, larvae of tobacco hornworm, *Protoparce sexta*, on tobacco near the traps. [From author's summary.]

1829. Stokes, W. M., and Martin, G. C.
Failure of an attempt to control root-knot nematode by electrical means.
Rhod. Tobacco, 1954, No. 6, pp. 30-2, illus.

In field tests at Trelawney Research Station in 1952/53 soil electrical treatments ranging up to 360 volts supplied from a trailer-mounted, tractor-drawn generator driven from the power take-off of the tractor had no effect on *Meloidogyne javanica*.

1830. Begg, J. A.
Residual control of wireworms in flue-cured tobacco.
Eighty-fourth A.R. ent. Soc. Ont., 1953, pp. 79-82, bibl. 4.

Trials between 1948 and 1953 at the Chatham Laboratory, Ontario, showed that BHC worked into the soil at 3·84 oz. of gamma isomer per acre satisfactorily controlled *Limonius agonus* for 5 years in a tobacco-rye rotation in sandy loam soil and that wireworm injury during that period was negligible. DDT at 1 lb. per acre was ineffective. Ethylene dibromide and DD mixture were satisfactory only in the year of application. Chlordane was unsatisfactory.

1831. Žigaev, G. N.
A bait method of controlling wireworms on *Nicotiana rustica*. [Russian.]
Tabak, 1954, **15** (4): 38-40.

BHC-treated oat seed was drilled in rows 45 cm. apart at the time of normal grain seeding on wireworm infested land. About 3 weeks later the oats were ploughed in and *N. rustica* was planted. The wireworm population in the treated plot was reduced by about 75% compared with that in the untreated one, the stand of tobacco was improved and yield was greatly increased. The method was cheaper and more effective than soil application of BHC.

Composition and curing.

(*See also* 1836b, g, h, j.)

1832. Wilkinson, F. B., Phillips, M., and Bacot, A. M.
Chlorogenic and caffeic acids in certain standard grades of U.S. Type 12 tobacco.
J. Ass. off. agric. Chem. Wash., 1954, **37**: 1004-12, bibl. 18.

Data are presented on the contents of chlorogenic and caffeic acids in samples of 21 grades of stemmed tobacco of U.S. Type 12. The results show that a significant relationship exists between the contents of these acids and the groups and grades into which the tobacco was classified under the Federal grading system. The chlorogenic acid content was found to range between 2·31 and 7·74% and the caffeic acid between 0·20 and 1·02%. [From authors' summary.]—Tobacco Div., agric. mkting Serv., U.S. Dep. Agric., Wash., D.C.

1833. LEGROS, R.
Détermination des taux de nicotine et de nornicotine de quelques variétés de tabac cultivées dans le pays et de quelques hybrides à l'études à la station. **(The determination of the nicotine and nornicotine contents of certain tobacco varieties cultivated in Belgium and certain hybrids under investigation at the Gembloux Station.)**
Bull. Inst. agron. Gembloux, 1954, **22**: 235-40, bibl. 8, illus.

In support of his opinion that the nicotine and nornicotine contents of tobacco should be examined separately the author presents analyses for 17 varieties, lines or hybrids, which show 5 to be high in nicotine (1·45–2·99%) and low in nornicotine (0·21–0·39%), 11 to be low in nicotine (0·06–0·68%) and high in nornicotine (1·10–2·99%) and 1 to be low in both alkaloids (0·24 and 0·40%).

1834. VICKERY, H. B., AND MEISS, A. N.
Chemical investigations of the tobacco plant. IX. The effect of curing and of fermentation on the composition of the leaves.
Bull. Conn. agric. Exp. Stat. **569,** 1953, pp. 125, bibl. 47.

The subject is dealt with under the following headings, with a summary at the end: Curing process, outline of experiment, analytical methods, behaviour of leaves during curing, behaviour of leaves during fermentation, variation in composition of different grades of wrapper tobacco. [This contribution should prove useful to tobacco growers outside Connecticut, especially those concerned with producing tobacco for cigar wrapping.]

1835. NEAS, I.
Notes on curing flue-cured tobacco.
Rhod. Tobacco, 1954, No. 7, p. 10.

Advice is given on fertilization, reaping, tying and hanging, barn spot control and barn temperature, humidity and ventilation control.

Noted.

1836.

a APPLE, J. L.
Variation in pathogenicity of *Phytophthora parasitica* var. *nicotianae*.
Plant Dis. Reptr, 1954, **38**: 774-6, bibl. 7, illus.

b BIRKHEAD, J. W.
How flue-cured tobacco is produced in Rhodesia.
Foreign Agric., 1954, **18**: 218-22, illus.

c BYERRUM, R. U., HAMILL, R. L., AND BALL, C. D.
The incorporation of glycine into nicotine in tobacco plant metabolism.
J. biol. Chem., 1954, **210**: 645-50, bibl. 19.

d (CALVERT, J.)
Controlling tobacco suckers.
Rur. Res. C.S.I.R.O., 1954, No. 10, pp. 6-7, bibl. 2, illus.
See *H.A.*, 23: 116 and 24: 1672.

e GAINES, J. G.
Irrigating flue-cured tobacco in Georgia.
Leafl. Ga agric. Exp. Stats **2,** 1954, pp. 2.

f HANEY, T. G., AND LYNEHAM, A. J. E.
The behaviour of tobacco varieties in Western Australia.
J. Agric. W. Aust., 1954, **3**: 685-91.
Notes on 10 varieties.

g HILL, A. V.
Some soil factors affecting quality in Australian flue-cured tobacco.
J. Aust. Inst. agric. Sci., 1954, **20**: 199-202, bibl. 11.
A review with special reference to nitrogen.

h LILFORD, D. C.
The "belt" system of grading.
Rhod. Tobacco, 1954, No. 7, pp. 12-13, illus.
An account of its operation.

i MATTHEWS, R. E. F.
Effects of some purine analogues on tobacco mosaic virus.
J. gen. microbiol., 1954, **10**: 521-2, bibl. 17.
Especially 8-azaguanine had an inhibiting effect.

j MOOSAD, C. R.
Jaffna method of curing tobacco (as practised in Coimbatore).
Indian Tobacco, 1954, **4**: 200-2, illus.

k PATEL, M. S., AND RAMARATNAM, D. S.
Tobacco in Andhra State.
Indian Tobacco, 1954, **4**: 176-90, illus.
Acreage (about half Virginia), production, culture, marketing, exports, economics.

l ROBINSON, H. F., MANN, T. J., AND COMSTOCK, R. E.
An analysis of quantitative variability in *Nicotiana tabacum*.
Heredity, 1954, **8**: 365-76, bibl. 14.
Genetic studies.

m SHARMA, G. D.
Tobacco in Farrukhabad.
Indian Tobacco, 1954, **4**: 192-8.

n TANDON, P. L., AND YESODA DEVI, S.
Prices and production trends in fluecured Virginia tobacco in India.
Indian Tobacco, 1954, **4**: 144-8.
Acreages, production and yields in Madras and Andhra from 1946 to 1954.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

General.

(*See also* 1187.)

1837. MALZY, P.
Quelques plantes du Nord Cameroun et leurs utilisations. (**Some plants of the northern French Cameroons and their uses.**)
J. Agric. trop. Bot. appl., 1954, **1**: 148-79, 317-32.

The baniotcal and vernacular names and very brief notes are given on the uses of 303 indigenous and exotic plants of 82 families in the northern French Cameroons. The Gramineae and Cyperaceae form the subject of a separate paper.

1838. DRAR, M.
Plants of raw material in the deserts of Egypt.
Proc. Sympos. sci. Probs Land Use arid Regs 1953, 1954, pp. 70-6.

Brief notes are given on Egyptian desert plants of general and local economic importance and of "traditional reputation". Some of the more important plants of universal economic importance are *Hyoscyamus muticus, Cassia acutifolia, Urginea maritima, Peganum harmala, Citrullus colocynthis, Lygeum spartum* and *Hyphaene thebaica.* Plants of local importance include *Moringa aptera, Thymus capitatus, Artemisia herba-alba, Balanites aegyptiaca* and *Silene succulenta.* Little is known of the plants of "traditional reputation". Those singled out for special mention are *Convolvulus hystrix, Marrubium alysson, Cymbopogon proximus, Ajuga iva, Asphodelus microcarpus, Leptadenia pyrotechnica, Calotropis procera* and *Avicennia officinalis.* The appendix lists 12 plants of universal importance, 16 of local importance and 71 of "traditional reputation".

1839. GLEISBERG, W.
Saatgut- und Samenkeimungsuntersuchungen bei Heil- und Gewürzpflanzen. I. (**Seed and seed germination research on medicinal and culinary plants. I.**)
Gartenbauwiss., 1954, **1** (n.s.): 181-217, bibl. 11.

Many data have been collected from experiments on germination of medicinal and spice plants. A list is given of the average weight of a sample of 1,000 seeds, the weight variation of such samples and the average number of seeds in a gram for many species. Investigations on the weight of 1,000 seeds of different seedling populations and clones of *Plantago lanceolata, Inula helenium, Melissa officinalis, Origanum vulgare* and *Hyssopus officinalis* confirm the genetical basis of the level of seed weights, which varied to a similar extent in different years. The weight of 1,000 seeds can be used as an indication of the value of well ripened and developed seeds. The influence of storage on germination was also studied. Seeds of *Taraxacum vulgare* germinated after 5 years storage. With *Arnica montana* only seeds from the 1952 and 1953 harvests germinated, and river sand was the most satisfactory substrate. *Matricaria chamomilla* germinated best in light, although the source and year of origin were responsible for variation in reaction to light and darkness. Seven-year-old fruits of *Foeniculum vulgare* had limited viability; in forcing the germination of older fruits was better with increased temperature, though forcing ability did not increase proportionately with shorter storage. The germination percentage of *Digitalis purpurea* could be determined 15 days after sowing. The influence of light on germination was studied in several medicinal plants.

Culinary and spice plants.

(*See also* 1795-1799, 1887d, e, m, 2263, 2314m.)

1840. PENNINGTON, C., JIMÉNEZ, F. A., AND THEIS, T.
A comparison of three methods of vanilla culture in Puerto Rico.
Turrialba, 1954, **4**: 79-87, bibl. 16, illus.

The decline in the production of vanilla (*V. planifolia*) in Puerto Rico since the peak year in 1944 is largely due to the widespread incidence of root-rot (*Fusarium batatis* var. *vanillae*). Satisfactory yields had been obtained in previous trials of certain shade and bed practices. An account is now given of field-scale trials in 1949/53, in which the practices in question were incorporated in 3 treatments, namely natural shade (50% sunlight) and continuous terraces, artificial (lath) shade (50% sunlight) and continuous terraces, and natural shade and individual terraces. None of the treatments gave effective control of the disease, the percentages of healthy plants surviving to the end of the experiment being only 30, 13 and 3 respectively. Total yields for the 3 treatments were similar.

Drug plants.

(*See also* 1887o, p, 2155, 2260v, 2267.)

1841. JAYAWEERA, D. M. A.
Part III—Indigenous and exotic drug plants grown in Ceylon.
Trop. Agriculturist, 1954, **110**: 105-16, bibl. 19.

Short notes are supplied on the following drug plants, their history, composition and uses: Calamus (*Acorus calamus*), calotropis (*Calotropis procera* and *C. gigantea*), calumba (*Jateorhiza palmata*), cambogia or gamboge (*Garcinia hanburii*), camphor (*Cinnamomum camphora*), capsicum (*Capsicum minimum*), cardamom (*Elettaria cardamomum*), caraway (*Carum carvi*), caryophyllum (*Eugenia aromatica*), cassiae fructus (*Cassia fistula*), catechu nigrum (*Acacia catechu*), chenopodium (*Chenopodium ambrosioides* var. *anthelminticum*), cinchona (*Cinchona* spp.), cinnamon (*Cinnamomum zeylanicum*), cocaine (*Erythroxylon coca*), and colocynth (*Citrullus colocynthis*). [For Parts I and II see *H.A.*, 16: 2226 and 23: 2025.]

1842. ANON.
Arzneipflanzen in forstlicher Zwischenkultur. (**Medicinal plants interplanted with forest trees.**)
Dtsch. Baumsch., 1954, **6**: 324.

In Germany medicinal plants are now planted with the trees when a forest is established. Particularly good results are reported with foxglove, common mullein, camomile, valerian, peppermint and marigold. The economics of this type of cultivation are briefly discussed.

1843. CHAKRAVARTY, H. L., AND CHAKRAVARTI, D.
Indian aconites.
Econ. Bot., 1954, **8**: 366-76, bibl. 8, illus.

Of the 24 species of *Aconitum* native to India, 13 are known to possess drug value, and some of these might prove useful substitutes for the more commonly used European species. In this article the nomenclature of the species is revised and notes are given on their botany, habitats and chemical constituents.—Presidency Coll., Calcutta.

1844. DAS, K. G., AND PILLAY, P. P.
Chonemorphine, the chief alkaloid in the root bark of *Chonemorpha macrophylla* G. Don: Part I.
Part II—Alkaline hydrolysis of chonemorphine.
J. sci. industr. Res. India, 1954, **13B**: 602-5, bibl. 6, illus., and 701-3, bibl. 3.

Chonemorpha macrophylla is a large, climbing, laticiferous shrub common in the hills of the Western Ghats. Powdered root and stem are used medicinally. The root bark contains 3·03% total alkaloids, which consist mainly of chonemorphine, the subject of the chemical investigations reported in these papers.

1845. SUBBARATNAM, A. V.
Studies in the alkaloidal constituents of *Gloriosa superba* Linn.
J. sci. industr. Res. India, 1954, **13B**: 670-1, bibl. 5.

This note records the isolation of a crystalline alkaloid from immature tubers of *Gloriosa superba*, which appears to be distinct from the colchicine and gloriosine isolated earlier from mature tubers [*H.A.*, 23: 2026]. Gloriosine has proved even more effective than colchicine in inducing polyploidy in *Crotalaria juncea* [Kumar, L. S. S., *Nature*, 1953, 171: 791-2].

1846. HIFNY SABER, A., AND BALBAA, S. I.
***Hyoscyamus muticus* L. in relation to its natural environmental conditions.**
Proc. Sympos. sci. Probs Land Use arid Regs 1953, 1954, pp. 77-110, bibl. 11, illus.

Information is given on habitat, associated plants, ecology, fruit and seed yield and seed characters. The seed output of the plant is enormous, reaching up to 2,250,000 seeds. The fruiting capacity is very high and the number of malformed seeds in each fruit is very small. The seeds are very small, varying from 1·06 to 1·47 mm. in mean length, from 1·04 to 1·27 mm. in mean breadth and from 0·57 to 0·77 mm. in mean thickness. The specific gravity ranges from 1·168 to 1·192 and the rate of sinking is 2·859 cm. per second at 30° C., while the mean weight of 100 seeds varies from 0·06585 to 0·07828 g. [From authors' summary.]

1847. GOZEVA, N.
Effects of cutting the capsules of poppy on the yield and quality of seed. [Macedonian, with English summary ½ p.]
Annu. Inst. Rech. agron. Skopje, 1953, **2**: 137-40, bibl. 1.

Tests have shown that when capsules of *Papaver somniferum* are harvested immature for opium extraction yields of seed and oil are only slightly less than those obtained when capsules are harvested mature.

1848. MONACHINO, J.
***Rauvolfia serpentina*—its history, botany and medical use.**
Econ. Bot., 1954, **8**: 349-65, bibl. 134, illus.

The roots of *Rauvolfia serpentina*, a sub-shrub of Indo-Malaysian distribution, have for centuries been used in Indian medicine. In 1952 the alkaloid reserpine was isolated from the roots, and this is now considered to be one of the most valuable drugs for the treatment of high blood pressure. Trial cultivation of the plant is being made. Experiments in Java showed that stem cuttings will root, although not easily, and that propagation by seed is also difficult. It is reported from Ceylon that the quickest method of propagation is by division of rootstocks. [See also *H.A.*, 25: 754.]

Essential oils.

(*See also* 1887b, h, i, j, q, t, 2309.)

1849. PENFOLD, A. R., AND WILLIS, J. L.
The essential oil industry of Australia.
Econ. Bot., 1954, **8**: 316-36, bibl. 6, illus.

The essential oil industry of Australia, located mainly along the east and south-east coasts, is founded primarily on eucalyptus oils from several species. Endemic oils of minor importance are those of Australian sandalwood (*Eucarya spicata*), Huon pine wood (*Dacrydium franklinii*) and the tea-trees (*Leptospermum citratum* and *Melaleuca alternifolia*). Among exotic oils, only that of lavender has been successfully introduced into commercial production. Notes are given on production, distillation and processing, and the species are dealt with according to the uses of the oil, i.e. medicinal, industrial and perfumery. Mention is also made of other endemic oils of potential economic value which are not yet in commercial production.

1850. BROWN, E., AND OTHERS.
Oils of *Cinnamomum* spp. from Sarawak as a source of safrole.
Colon. Plant Anim. Prod., 1954, **4**: 239-43.

The investigations reported showed that the wood of *Cinnamomum parthenoxylon* and the wood, bark and leaves of an unidentified *Cinnamomum* sp. known in Sarawak as "medang kerangas", contained volatile oil in appreciable quantities. The cost of exploiting the former may, however, be too high as the safrole content is only 50% and the tree is not very common. "Medang kerangas" contains rather less oil, but the safrole content ranged from 75·5% in the bark to 94·9% in the wood. As this species grows on a podsol soil that is difficult to use for other purposes it is suggested that a trial plantation be established.

1851. MÜHLE, E.
Möglichkeiten zur Bekämpfung des Pfefferminzrostes, *Puccinia menthae* Pers., mit neuen Fungiziden. **(The possibilities of controlling peppermint rust with new fungicides.)**
Dtsch. GartenbW., 1954, **12**: 237-8, bibl. 3.

Mint stolons, after overwintering in frames, were treated in March with a suspension of a mercuric fungicide. The stolons were in the suspension and then dried for alternating periods of 12 hours during a 72-hour period. They were finally planted out in frames and lightly covered with sand. The treatment gave complete control of the fungus.

1852. Campbell, L.
Experiments on mint rust control.
From abstr. in *Phytopathology*, 1954, **44**: 484.

Zinc undecylenate dust and pre-emergence sprays of premerge (dinitro amine), manzate, karathane, captan and zinc undecylenate all gave very good results in mint rust control experiments. Premerge also reduced annual weeds by 99·8%.

1853. Green, R. J., Jr., and Luck, J. V.
Effect of soil fumigation and planting stock on *Verticillium* wilt of peppermint.
From abstr. in *Phytopathology*, 1954, **44**: 490.

Chlorobromopropene and pentachlorodiene were the best of the soil fumigants tested against *Verticillium albo-atrum*. Muck soils under greenhouse conditions required two or three times the concentration needed for mineral soils. In field tests with CBP-55 80 gal. per acre gave the highest yields and lowest infection rates. Survival was poor in heat-treated rhizomes and there was no significant difference in infection level between field-dug and known disease-free planting stock.

1854. Ivanoff, D., and Ivanoff, C.
Sur la conservation des fleurs de roses avant leur hydrodistillation pour la préparation de l'huile de roses. (**Methods of keeping rose flowers prior to distillation for the preparation of rose oil.**) [Russian summary 4 lines.]
C.R. Acad. bulg. Sci., 1953, **6** (3): 13-16, bibl. 4.

When rose flowers were left exposed to the air for 24 hours before distillation, their essential oil content fell by 50%. When the whole heads were submerged in a 20% salt solution within 5 hours of picking, there was no decrease in oil content and they could be kept satisfactorily in the solution for as long as 120 hours.

Fibres.

(*See also* 1182, 2195, 2286, 2300, 2301.)

1855. Istas, J. R.
Belang van de biometrie in het onderzoek van grondstoffen voor een Kongolese pulpnijverheid. (**The importance of biometry in the analysis of the raw materials for a possible paper pulp industry in the Belgian Congo.**) [French summary ¾ p.]
Bull. agric. Congo belge, 1954, **45**: 1249-76.

Data are given on the length, breadth, cell cavity size and wall thickness of the fibres of many indigenous and exotic broad-leaved and coniferous trees, including 9 *Eucalyptus* spp., *Acacia mollissima*, and *Grevillea robusta*, and of 16 bamboo species and *Cyperus papyrus*. In general, bamboos and certain mixtures of broad-leaved timbers are promising while the conifers and the papyrus are of limited interest.

1856. Villegas, V.
Durability of local ropes for tethering cattle.
Philipp. Agric., 1953, **37**: 430-2, illus.

The ropes were made from *Musa textilis*, *Arenga saccharifera*, *Corypha elata*, *Grewia multiflora*, *Melochia umbellata* and *Bambusa spinosa*.

1857. Bócsa, I.
A kender heterózis-nemesítésének eredményei. (**Results of breeding for heterosis in hemp.**) [English, Russian and German summaries 1 p. each.]
Növénytermelés, 1954, **3**: 301-16, bibl. 11, illus.

The possibility of using hybrid vigour for increasing commercial hemp production was studied. A medium-late Chinese variety was crossed with 4 early Hungarian varieties of Italian origin. The best cross was Chinese ♀ ×Kompolti F ♂, and during 3 years the F_1 plants of this combination yielded 23·4% more stalks and 18·2% more fibre than the more productive of its parents, Kompolti F. The hybrids proved resistant to *Psylliodes attenuata*.

1858. Haarer, A. E. (Cramer, P. J. S.).
Kapok.*
World Crops, 1955, **7**: 71-3, 78, bibl. 5, illus.

This general account of the kapok tree, *Ceiba pentandra*, in Indonesia includes information on the treatment of the crop and the uses of kapok floss, seed oil and by-products. There are also brief notes on the Indian kapok, *Bombax malabaricum*.

1859. Robinson, B. B., and Johnson, F. L.
Abaca: a cordage fiber.
Agric. Monogr. U.S. Dep. Agric. **21**, 1953, pp. 130, bibl. 195, illus., 65 c.

This monograph discusses the physical and chemical characteristics of manila hemp as compared with other cordage fibres, and the economic and agricultural problems connected with production. Cultural information includes climatic and soil requirements, propagation and culture, diseases and pests in the Philippines and Central America, varieties, breeding and harvesting.

1860. Batchelder, C. H.
Experimentos con insecticidas para combatir el picudo negro (*Cosmopolites sordidus* Germ.) en las plantaciones de abacá. (**Experiments with insecticides against *Cosmopolites sordidus* in manila hemp plantations.**)
Turrialba, 1954, **4**: 88-93, bibl. 5, illus.

In a U.S. Department of Agriculture programme for improving the production of abacá fibre, toxaphene, chlordane, aldrin, and dieldrin were compared for use in the control of the root borer, *Cosmopolites sordidus*, at Changuinola, Panama, during 1951-52. The materials were applied as a spray at the base of the plants. Results showed superior residual capacity and performance by dieldrin as measured by reduction of the adult population, larval tunneling, and the occurrence of plant tip-over. Residues of aldrin and dieldrin were effective during 36 and 41 weeks. No evidence was found that any of the insecticides had harmful effects upon the plants. [From author's abstract.]

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* Based on manuscript by the late Dr. P. J. S. Cramer.

1861. BOYCE, D. S.
The development and design of a hagotan for the extraction of manila hemp fibre.
Malay. agric. J., 1954, **37**: 218-24, bibl. 3, illus.

Both hand- and power-operated machines are described which extract the fibre from the tuxies (stripped sections of pseudostem). A possible future development is a tractor-mounted hagotan which could carry extracted fibre to the factory, thus saving the transport of the much bulkier pseudostems or tuxies.

1862. GANGSTAD, E. O., SEALE, C. C., AND PATE, J. B.
Preliminary studies on the fiber qualities of ramie varieties.
Turrialba, 1954, **4**: 66-71, bibl. 15, illus.

In comparisons between 7 ramie varieties in Florida the fibre of *Boehmeria nivea* Clone E was significantly stronger than that of the commercial variety *B. nivea* P.I. 87521, whereas *B. utilis* P.I. 205502 was significantly inferior to the commercial variety in strength, wear and flex.

1863. AGPAOA, B. P.
Three methods of extracting the fiber of *Sansevieria trifasciata.*
Philipp. Agric., 1953, **37**: 399-406, illus.

The retted fibers of *Sansevieria trifasciata* Prain. were significantly weaker in tensile strength than the fibers obtained by the "sipit" method and the decorticating method, but they gave the highest mean weight of dry fibers in grams per leaf. The fibers from the "sipit" method were lighter in color than those extracted by retting or decortication. [Author's summary.] In the sipit method the leaf is placed between the 2 halves of a piece of bamboo split lengthwise for part of its length, and is pulled through while the 2 halves are held together.

1864. TANGANYIKA SISAL GROWERS' ASSOCIATION (LOCK, G. W., AND DIEKMAHNS, E. C.).
Annual Report of the Sisal Research Station, Mlingano, Ngomeni, 1952, pp. 55.

Part I includes an outline of research at Mlingano and elsewhere and Part II consists of full details of experiments of which a summary follows. *Field trials in the station.* A cultivation trial started in 1936 with 6 treatments ranging from continuous clean weeding to no weeding has demonstrated the extreme inadvisability of clean weeding. In a spacing trial comparing densities ranging from 1,666 to 10,000 per ha., total yields and plant populations were closely related in the first cycle. In a spacing × cutting trial the densities are 4,000, 5,000 and 6,000 per ha., and the cutting treatments consist of cutting at 1½, 2 and 2½ years from planting, leaving 8, 16 and 24 leaves per plant at cutting cycles of 6, 9 and 12 months; leaf production has varied inversely with plant population but has not been markedly affected by the cutting treatments. Results show that young sisal should not be cut heavily. Fertility trial: a comparison is being made of 9 methods of rotating sisal with soil-restorative crops including elephant grass, *Glycine javanica*, *Tephrosia candida* and natural vegetation. A grass rotational trial on sisal-worn land is designed to restore fertility by means of elephant or guinea grass and fertilizing. Factorial manurial trial: first yields show a considerable response to N, a small response to P and Ca, and none to K. A fertilizer placement trial showed that N and P are best applied on the rows. Mulching trial: sisal waste gave the biggest response followed by inorganic fertilizer and then by other mulches. Ridging trial: double-row sisal planted on ridges outgrew that planted on the flat in the first 2 years of the experiment and has outyielded it during the first 2 years of production. Interplanting trial: sorghum significantly, and maize slightly, reduced the yield during the first 2 years of an experiment begun in 1950, but beans had no effect. Bulbil nursery manurial trial: spacing at 50 × 25 cm. gave larger plants than spacing at 30 × 25; sisal waste significantly increased size at both spacings. Sisal waste manurial trial: leaf production was increased by the entire waste and by the solid fraction but not by the liquid fraction. In trials with *Agave* hybrids 4 out of 19 selections gave promising results. *External trials.* A spacing × cutting trial in Kilosa district has given results similar to those at Mlingano except that fibre yields have been good at 6,000 plants per ha. In a banding disease manurial trial yield responses to K were large but those to N and P were not significant. *Plant Physiology.* P, K and Ca analyses of material from the factorial manurial experiment showed that for P and K a clear relation exists between fertilizing and leaf content and that P uptake is greater with higher levels of N in the soil. Studies were made on banding disease due to K deficiency, on purple leaf tip roll in which K content is always, and P content sometimes, low, and on chlorotic mottle which is associated with low Ca and Mg. Leaf injection tests were also made with all major plant nutrients and some minor elements. In tests on the effects of BHC and root-growth-promoting substances, bulbil growth as expressed by weight after 15 months was depressed by BHC soil dressings, by BHC plus hormone and by presoaking in naphthaleneacetic acid, and increased by presoaking in indoleacetic acid or indolebutyric acid. Other studies concerned bole rot (*Aspergillus niger*) control, the effect of manurial treatment on the number of fibres per leaf, and breeding. [The 1950 and 1951 reports have also been received.]

1865. KOVACEVIC, J.
Agave americana L. Plante textile de quelques îles dalmates. (***Agave americana*, a fibre plant of some Dalmatian islands.)**
J. Agric. trop. Bot. appl., 1954, **1**: 220-1, bibl. 4.

Agave americana grows wild on the Dalmatian islands of Hvar and Vis and is used for making rope and for other purposes.

Hops.

(*See also* 1206, 1802y.)

1866. CAWTHRON INSTITUTE AND D.S.I.R., N.Z.
Hop Research Annual Report for 1953-54, pp. 2.

Work is briefly discussed. Chemical investigations concern resins and sugars in hops and boron and magnesium deficiencies in the hop plant. Breeders have had at their disposal New Zealand varieties and seedlings and Wye varieties from England. Cultural experiments have included trials on height of wire work, stringing and pruning. Diseases under observation are black root rot, its transmission and chemical control, verticillium diseases and incurled leaf disorder.

1867. Meneret, G., Bonnat, M., and Guiolet, J.
Forme des bractées chez les houblons cultivés. **(Bract form in cultivated hops.)**
Ann. Amél. Plantes, 1954, 4: 209-46, bibl. 36, illus.

The morphological characters of the plant and male flowers of a large collection of hop varieties were studied at Dijon during the years 1946–50. Within the limits of annual variation, a ratio of bract length to width was sufficiently constant to be a useful clonal character. Three types of bracts were found, viz. narrow, intermediate and wide elliptical.

1868. Keller, K. R.
Relative value of repeated annual fertilizer applications on a perennial crop, *Humulus lupulus* L.
Agron. J., 1954, **46**: 535-7, bibl. 9.

Yield data were obtained from 5 consecutive years, 1949 to 1953 inclusive, from a 6^2 factorial fertilizer trial on the variety Fuggles grown in a commercial hop yard near Corvallis, Oregon. The results from the analyses of variance of harvest weights for individual years and for the 2, 3, 4 and 5-year summaries indicated similar inferences. These results suggested that the conclusions drawn based on any single year or summary of 2 or more years were essentially the same, although there were significant differences among years. Maximum mean yield response per plot for the 1, 2, 3, 4 and 5-year summaries, when using N alone, were from the application of 225 and 300 lb. per acre, although no significant differences were indicated beyond the application of 75 lb. per acre. Consistent yield levels of the same magnitude as that for the higher yielding N rates were obtained from the application of 75 lb. of N in combination with 75 lb. of P_2O_5. Mean net profit in dollars per plot, based on harvest and fertilizer costs and price per lb. of hops, was computed. In general, expected mean net profit per plot followed closely the conclusions drawn for the yield data. [Author's summary.]

1869. Askew, H. O., Monk, R. J., and Hodgson, J.
Chemical changes in the developing hop cone.
N.Z. J. Sci. Tech., Sect. B, 1954, **36**: 227-39, bibl. 4.

Hop cones were sampled from time of flowering to full development. With continued development of the cones, the moisture content passed through a maximum to decrease steadily until harvest. At the same time the cones increased in weight, which later became almost constant. With continued development of the cones, the mineral and nitrogen contents of the dry matter tended to become constant at about the following values: Soluble ash, 8·3%; insoluble ash, 1·4%; CaO, 1·6%; MgO, 0·6%; P_2O_5, 0·9%; K_2O, 2·9%; N, 3·1%. Intake of minerals and nitrogen was rapid in the young cones, but as they matured the intakes of these constituents tended to cease, except that silica was absorbed at a steady rate right to the end of the experiment. On a per cone basis, the following nutrients had been absorbed at maturity: crude silica, 5·0 mg.; CaO, 6·1 mg.; MgO, 2·2 mg.; P_2O_5, 3·2 mg.; K_2O, 10·7 mg.; N, 11·3 mg. Alpha and beta resins increased to almost constant values of 3% and 12·6% respectively. Glucose, fructose, and sucrose contents showed maximal values when the cones were young; the first two sugars then decreased steadily as the cones grew, to finally reach 0·65% and 0·5% respectively. Sucrose in later samples was relatively constant at about 1%. Once the cones had definitely taken shape, there were statistically significant negative correlations between sugar and resin contents of the dry matter. As the cones grew, much larger amounts of resins appeared than could be accounted for by loss of reducing sugars. This is explainable if constant conversion of synthesized sugars into resins takes place. [Authors' summary.]

1870. Askew, H. O., and Monk, R. J.
An inverse relationship between resins and sugar contents of hop cones.
J. Inst. Brew., 1955, **61**: 32-9, bibl. 3.

In cured hop cones from 46 samples derived from 17 varieties statistically significant negative relationships were found between glucose, fructose and total reducing sugar contents on the one hand, and α-resin and total petroleum-ether soluble solids on the other. High sugar content is therefore found with low resin content. [From authors' summary.]

1871. Laning, E. R., Jr.
Chemical suckering of hops.
Res. Progr. Rep. 14th west. Weed Control Conf. 1954, Tucson, Ariz., pp. 108-9.

In preliminary trials in Oregon 9 chemicals were applied to the hop variety Fuggles for sucker control. All plots were hand stripped once early in the season and then chemically treated twice. Dinitro amine was the only material which did not reduce yields significantly, but it also failed to suppress suckering. 3-chloro-IPC, more effective for sucker control, reduced both yield and quality more than any other chemical tested. Some commercial products appeared more promising.

1872. Zattler, F., Jehl, J., and Liebl, H.
Versuche zur Maikäfer- und Engerlingsbekämpfung auf dem Hopfenversuchsgut Hüll 1950-1952. **(Trials on the control of cockchafers and their grubs at the Experimental Hop Garden, Hüll, 1950-52.)**
Hopfenrundschau, 1953, Vol. **4**, No. 7-9, from abstr. in *Z. PflKrankh.*, 1954, **61**: 546-7.

A severe infestation of cockchafers (*Melolontha vulgaris*) killed 20–25% of the plants at the Experimental Hop Garden, Hüll, in 1951. Spraying with parathion or lindane gave good control of the adult beetles, while soil treatment with BHC or lindane is recommended for the destruction of the grubs. Detailed instructions are given on timing soil applications to avoid plant injury and off-flavour.

Insecticidal and rodenticidal plants.

(*See also* 1887f.)

1873. Jacobson, M.
Occurrence of a pungent insecticidal principle in American coneflower roots.
Science, 1954, **120**: 1028-9, bibl. 9.

The dried roots of the American coneflower, *Echinacea* *angustifolia*, have yielded a pungent compound that has proved toxic to house flies. This compound which has been called echinacein may be identical with neoherculin, but final identification must await the isolation of larger quantities of pure material.—U.S. Dep. Agric., Beltsville, Md.

1874. Glover, J.
Chilling and flower-bud stimulation in pyrethrum (*Chrysanthemum cinerariaefolium*).
Ann. Bot. Lond., 1955, **19**: 138-48, bibl. 4.

Field experiments show that the yield of pyrethrum flowers in East Africa is inversely related to mean maximum temperatures, and directly related to the number of hours spent by the plant at or below 60° F. some three months earlier. They suggest that chilling is an essential part of flower-bud development. Experiments with "blind" plants in a cold-box show that 240 hours' continuous exposure at 60° F. is sufficient to stimulate the development of flower-buds, and less may be adequate. Attempts were made to delay the period of maximum flower production by cutting back new growth. These failed because chilling was so intimately connected with flower-bud development. The removal of buds which would normally be stimulated at the period of greatest cold merely reduced subsequent yield. There was no compensating increase in yield at a later date. The temperature régime of the Kenya highlands is such that it is possible to select 75° F. as a tentative upper limit of mean maximum temperature which, if prolonged for a week or more, leads to the inhibition of flower production. It is the range of temperatures associated with this maximum which probably produces the inhibition, not the temperature itself. [Author's summary.]—E. Afr. Agric. For. Res. Organ.

1875. Starý, F.
Die Heilpflanzen Albaniens. I. Gemeine oder echte Meerzwiebel, *Urginea maritima* (L.) Baker. **(Medicinal plants of Albania. I. Squill, *Urginea maritima*.)** [Czech and Russian summaries ½ p. each.]
Preslia, 1954, **26**: 365-84, bibl. 77, illus.

The distribution of squill in the Mediterranean region is discussed with particular reference to Albania. The biology of the plant, which does not flower regularly every year, is described. To obtain the best quality bulbs for use in the preparation of drugs and rodenticides, they should be harvested at the beginning of the first rest period, starting in mid-June, and dried in the sun. In cultural trials vegetative proved more satisfactory than seed propagation. Among 3 methods of treating mother bulbs the best results were obtained when the root base of the bulbs was cut out. On the question of the colour of bulbs and stems, the author disputes the existence of the varieties *alba* and *rubra* and maintains that red coloration is merely due to exposure to the sun.

Rubber plants.

(*See also* 1887g.)

1876. Marzocca, A.
Cultivo mecánico del kok-saghyz. **(Mechanized culture of kok-saghyz.)**
Idia, 1954, No. 78, pp. 2-6, illus.

An account is given of 3 years' research on mechanization in kok-saghyz culture at the Botanical Institute of the Argentinian National Agricultural Research Centre. The operations included deep ploughing (25–30 cm.), discing, harrowing and rolling, sowing with a modified Farmall A or modified alfalfa sower, inter-row cultivation with a modified Planet or Farmall cultivator, harvesting the seed with a threshing fan operated in reverse or a modified mower with a suction fan in place of the cutter and harvesting the plants with a radial-type potato-harvester. Details are provided of the modifications made to the various machines. Incidental information is given on the depth of tilth required (10 cm.), vernalization of seed by damping and cold-storage for 3–4 days at 5° C. which gives more uniform and more rapid germination, and on depth of sowing (2 cm.).

1877. Marzocca, A.
T[*araxacum*] *erythrospermum* Andrz. adventicia en Argentina. **(*Taraxacum erythrospermum* accidentally introduced into Argentina.)**
From abstr. in *Idia*, 1954, No. 78, p. 9.

Some of the red "seeds" (achenes) of *Taraxacum erythrospermum*, a weed of kok-saghyz crops in the U.S.A., were observed in a batch of [the black] seeds of *Taraxacum kok-saghyz* at the Botanical Institute of the Central Experiment Station. A few specimens of the plant, which does not occur naturally in Argentina, have been found growing at the Central Experiment Station. The species could spread rapidly by wind dispersal of the achenes. It is of no value as a rubber plant.

Seed oils.

(*See also* 1887a, k, l, n, s, u.)

1878. Oilar, R. D.
[Some little-known or unlisted oils of Ecuador (?).]
J. Amer. Oil Chem. Soc., 1954, **31**: 142-3, from abstr. in *Olearia*, 1954, **8**: 156.

Brief notes are given on the seed- or kernel-oils of brazilargo (an unknown myristicaceous plant), caracolillo (*Anacardium excelsum*), chapil (a palm), guangara (*Dialyanthera gordoniaefolia*), tangare (*Carapa guianensis*), tagua (*Phytelephas macrocarpa*), and *Cocos butyracea*.

1879. Bouffil, P.
Peut-on cultiver du ricin au Sénégal? **(Can castor be grown in Senegal?)**
Bull. Centre Rech. Agron. Bambey, 1954, No. 10/11, pp. 124-9, from abstr. in *J. Agric. trop. Bot. appl.*, 1954, **1**: 364.

Castor grows very well in Senegal. Sowing takes place in July and harvesting from December to April when the plant is normally uprooted, though it can be grown as a perennial. A variety collection was made at Bambey in 1928. Many varieties received as indehiscent proved to be dehiscent under the intense dry season conditions in Senegal. Few of the varieties in the collection are indehiscent or semi-dehiscent and it would appear that harvesting must consist of picking up fallen seeds from the ground. Varieties, sowing date, dehiscence, method of culture and yield are discussed.

1880. Farroq, M. O., and Siddiqui, M. S.
[*Leucaena glauca* seed oil (?).]
J. Amer. Oil Chem. Soc., 1954, **31**: 8-9, from abstr. in *Olearia*, 1954, **8**: 156.

The seed oil of *Leucaena glauca* contained 8·8% of a greeny-black oil of which the characters and fatty acid composition are given.

1881. Calvert, O. H., and Thomas, C. A.
Some factors affecting seed transmission of safflower rust.
Phytopathology, 1954, **44**: 609, bibl. 2.

Safflower rust, *Puccinia carthami*, was found to be transmitted by teliospore-infested but not by uredospore-infested seed. The effects of varietal resistance, temperature and type of teliospore on transmission were studied.

Tannin plants.

(*See also* 2306.)

1882. Ripley, L. B., and Webb, D. v. W.
Aerial oil-spraying of wattle plantations against bagworm.
Fmg S. Afr., 1954, **29**: 495-8, plus 2 coloured plates.

In the past the extensive aerial application of cryolite dust proved a satisfactory means of controlling bagworm [*Acanthopsyche junodi*] on wattles in fine weather, but not during rainy periods. Large-scale trials in 1952 and 1953 have shown that, in general, efficient control of bagworms up to the 3rd instar can be obtained by aerial applications of 2½ to 3 gallons per acre of light diesel oil (Diesoline) containing 1½ to 3 lb. actual toxaphene. In 1953 about 10,000 acres were treated at an average rate of 36 acres per hour per aeroplane. Procedures necessary to ensure the success of the operation are outlined and the value of coloured aerial photographs to compare protected and defoliated areas is stressed.

Sundry plants.

(*See also* 1887r, v.)

1883. Wallace, J. C.
Woad.
Agriculture, Lond., 1955, **61**: 501-4.

The biennial *Isatis tinctoria*, the first-year leaves of which were used for the manufacture of woad, was last grown commercially in England in 1924. The author provides historical notes on some aspects of the cultivation and processing of this once profitable Fenland crop.

1884. Sheth, M. C., and Desai, C. M.
Chemical examination of the bark of *Jatropha glandulifera* Roxb.
Sci. and Cult., 1954, **20**: 243-4, bibl. 2.

The bark of *Jatropha glandulifera* has emulsifying and gel-forming properties. Chemical analysis revealed the presence of glucose, sterols, myricyl alcohol, myristic acid, stearic acid and (probably) petroselenic acid.—M.T.B. College, Surat.

1885. Feurt, S. D., and Fox, L. E.
Report on wax from several species of *Tillandsia* and *Ananas comosus* (L.) Merr.
Science, 1955, **121**: 42, bibl. 6.

The extraction of a hard wax from Spanish moss (*Tillandsia usneoides*) was reported in 1953 [see *H.A.*, 23: 4413e]. In order to find other commercial sources of the wax, other species of the same family were investigated. It was found that *T. tenuifolia*, *T. juncea*, *T. balbisiana*, *T. aloifolia*, *T. simulata*, *T. fasciculata* and *T. circinata* all contained hard waxes similar to that of Spanish moss. The waxes comprised 4–5% of the fresh weight of the plants. From pineapple, *Ananas comosus*, a soft wax was extracted. From the waste of pineapple fruits 1·4% wax was reclaimed. Physical and chemical characters of the wax are reported.—Coll. Pharmacy, Univ. Fla, Gainesville.

1886. Schultes, R. H.
Un nouveau tabac à priser de l'Amazone du Nord-ouest. **(A new snuff from the upper Amazon.)**
J. Agric. trop. Bot. appl., 1954, **1**: 298-311, illus.

The use by certain Indian tribes in eastern Colombia and northwestern Brazil of an extremely toxic snuff has recently been brought to light. It is prepared from several species of *Virola*, including *V. calophylla* and *V. calophylloidea* and is used in sorcery, divination and the diagnosis of diseases. Notes are given on its preparation and use. The identity of another kind of snuff called *parica* and long known to be used by South American Indians is discussed.

Noted.

1887.

a Aggarwal, J. S.
Khakan fat (pilu oil) as a substitute for coconut oil in soap.
Oils and Oilseeds J., 1954, **7** (4): 5-6, bibl. 4, from abstr. in *Oléagineux*, 1955, **10**, p. 81, No. 143.
The seed oils of *Salvadora oleoides* and *S. persica*.

b Arthur, H. R., and Hui, W. H.
An examination of the Ericaceae of Hong Kong. The occurrence of ursolic acid.
J. chem. Soc. Lond., 1954, p. 4683, bibl. 1.
In the leaves of 4 *Rhododendron* and 1 *Enkianthus* spp. See also *H.A.*, 25: 746.

c Ash, A. S. F.
Seaweed as a food.
Food Res. Quart., 1954, **14**: 71-3, bibl. 20.
A review.

d Brown, E., Coveney, R. D., and Islip, H. T.
Black pepper from Nigeria.
Colon. Plant Anim. Prod., 1954, **4**: 244-8.
Analytical data on sample of fair quality.

e Escalante, M. G., and Liceaga, J. A. I.
La sustitución de la pimienta negra (*Piper nigrum* L.) con los frutos del aguaribay (*Schinus molle* v. *areira* (L.) DC.). **(Fruits of *Schinus molle* var. *areira* as a substitute for black pepper, *Piper nigrum*.)**
Rev. Fac. Agron. Eva Perón, 1954, **30**: 130-3, bibl. 18, illus.
Description and chemical composition.

f FEUELL, A. J., AND JARVIS, M. W.
Pyrethrum flowers from Aden.
Colon. Plant Anim. Prod., 1954, **4**: 260-2, bibl. 3.
Examination showed sample to be promising.

g HOREL, J., AND POSPÍŠIL, O.
Metodika rychlého kvantitativního stanovení kaučuku a pryskyřic v koksagyzu. **(Rapid quantitative determination of rubber and resin in kok-saghyz.)** [Russian and German summaries 1½ pp. each.]
Sborn. čsl. Akad. zeměd. Věd, Ser. A, 1954, **27**: 321-32, bibl. 18, illus.

h IVANOFF, D., IVANOFF, C., AND OGNIANOFF, I.
Sur une nouvelle méthode de dosage de l'huile essentielle des fleurs de roses. **(A new method of determining the essential oil content of rose flowers.)** [Russian summary 4 lines.]
C.R. Acad. bulg. Sci., 1953, **6** (3): 25-8, bibl. 1.

i IVANOFF, D., MARÉCOFF, N., AND OGNIANOFF, I.
Sur la composition de l'huile de roses bulgare obtenue par la méthode soviétique. **(The composition of Bulgarian rose oil obtained by the Soviet method.)** [Russian summary 9 lines.]
C.R. Acad. bulg. Sci., 1953, **6** (3): 17-20, bibl. 6.

j IVANOFF, D., AND OTHERS.
Application de la réaction de Rosenthaler pour fixer la fin de distillation dans la production de l'huile de roses. **(The application of the Rosenthaler reaction to determine the end point of distillation in the production of rose oil.)** [Russian summary 6 lines.]
C.R. Acad. bulg. Sci., 1953, **6** (3): 21-4, bibl. 3.
See also *H.A.*, 24: 4017.

k IYENGAR, K. G., AND SASTRY, K. S. K.
Oil-yielding trees of Mysore—1. Neem and its uses.
Mysore agric. J., 1954, **30**: 27-31, bibl. 8.
Notes on *Azadirachta indica* and its oil.

l JOSHI, N. C.
Rotting of castor seeds by *Cephalosporium curtipes* Sacc.
Sci. and Cult., 1954, **20**: 248-9, bibl. 4, illus.
Under moist laboratory conditions.

m KHAN, M.-u.-D., AND SHARIF, M.
Cultivation of ginger in east Pakistan and possibilities of its introduction in the Punjab.
Punjab Fruit J., 1954, **18** (66/7): 27-9.
Environment, cultural practices, yields.

n LIGTHELM, S. P., AND OTHERS.
[The kernel oil of *Sclerocarya caffra* or *maroola* (?).]
J. S. Afr. chem. Inst., 1951, **4** (2): 1-6, from abstr. in *Olearia*, 1954, **8**: 215.

o MOTHES, K.
Über Wurzel-Spross-Beziehungen. **(On root-shoot-relations.)**
Kulturpfl., 1953, **1**: 157-69, bibl. 13.
Including work in progress on alkaloids in solanaceous grafts.

p NATH, B.
Chemical examination of the heartwood of *Melia azedarach.*
J. sci. industr. Res. India, 1954, **13B**: 740-1, bibl. 8.
Extracts of which have medicinal properties.

q PIGOTT, C. D.
Species delimitation and racial divergence in British *Thymus.*
New Phytol., 1954, **53**: 470-95, bibl. 37, illus.

r POLLARD, J. K., Jr., AND SPROSTON, T.
Nitrogenous constituents of sap exuded from the sapwood of *Acer saccharum.*
Plant Physiol., 1954, **29**: 360-4, bibl. 15.

s POOL, D. D., AND HADLEY, H. H.
Haploidy in castorbeans.
J. Hered., 1954, **45**: 285-8, bibl. 10, illus.
Description and cytology of sterile haploid plants.

t PULTZ, L. M.
Mint farming.
Fmrs' Bull. U.S. Dep. Agric. **1988,** revised 1954, pp. 24, illus.
Mainly for peppermint and spearmint oils.

u RAO, B. C. S., RAO, K. N., AND JOIS, H. B.
[*Moringa pterygosperma* seed oil (?).]
J. Indian chem. Soc., 1953, **30**: 477-80, from abstr. in *Olearia*, 1954, **8**: 215.
The seeds contained 31·5% oil, here characterized.

v SPICKETT, R. G. W., AND WARD, J. B.
Sago flour from Sarawak.
Colon. Plant Anim. Prod., 1954, **4**: 250-4.
A standard method of assessing quality suggested.

FLORICULTURE.

General.

(*See also* 1184, 1188, 1207, 1210, 1231, 1491, 1575-1581, 1592-1595, 1802g, o, y, 2274, 2291, 2292, 2305.)

1888. Aalsmeer.
Jaarverslag van het proefstation voor de bloemisterij te Aalsmeer over 1953. **(Annual report of the Research Station for Floriculture, Aalsmeer, for 1953)**, pp. 99.

The many activities reported on include: *Carnations:* the influence of watering before and at the time of taking cuttings on subsequent rooting; influence of time of taking cuttings on yield; methods of watering; varietal resistance to *Phytomonas caryophyllii*, and *Fusarium oxysporum*. *Begonia:* mildew control. *Chrysanthemum:* variety trial with anemone-flowered varieties. *Cyclamen:* varietal purity of Perle von Zehlendorf; trials with potting composts; control of cyclamen mite. *Dahlia:* variety trial; short-day treatment gave higher tuber weight, but fewer flowers than untreated plants of Stella Maris and Firefly. *Euphorbia fulgens:* effect of using double-walled bakelite pots on incidence of foot-rot, *Fusarium* sp. *Freesia:* seed germination tests; liming; weed control by chemicals. *Gerbera:* there was a 4% reduction of foot-rot in plants grown in double-walled bakelite pots. *Gloxinia:* variety trial. *Hedera:* control of cyclamen mite by parathion. *Hydrangea:* influence of soil type on flower colour. *Orchids: Tenuipalpus orchidarum* was controlled on *Dendrobium* by TEP, but flower injury was apt to occur. *Prunus triloba:* rootstock trial; flower forcing after 4 weeks at −2° to −3° C. *Roses:* variety trial; rootstock trial; the rose Geheimrat Duisberg was satisfactorily grown in a dutch-light structure; artificial induction of deficiency symptoms; excellent control of mildew was given by 0·5% Vomasol, a sulphur product. *Lilac:* Mme Florent Stepman used as an intermediate stock had a favourable influence on vegetative growth of Marie Legraye; 1-year-old budded plants of Stepman were satisfactorily forced immediately after Christmas. *Viola:* control of *Botrytis cinerea* on seed plants. *Stocks:* selection for 100% double-flowering. *Berried shrubs:* those under investigation included *Ilex* spp., *Cotoneaster*, *Callicarpa*, *Symphoricarpus albus*. *Flower pots:* trials with non-porous, impregnated "Laxa" paper pots and with self-watering ornamental pots. *Sand culture: Phialophora cinerescens* did not spread among carnations in sand culture but *Phytomonas caryophyllii* spread in the nutrient solution. *Plant protection materials:* aramite gave good control of red spider mite on carnations; malathion gave variable but generally satisfactory control of aphids; phytocidal trials were carried out with BHC and systox. [See also separate abstracts.]

1889. Mameli-Calvino, G. E.
Relazione dell'attività svolta dalla Stazione Sperimentale di Floricoltura nell'anno 1953. **(Annual Report of the Floricultural Experiment Station [at San Remo] for 1953.)** [English summary 6 lines.]
Ann. Sper. agrar., 1954, Vol. **8,** No. 6, Suppl. pp. xxxiii-lxxi, illus.

An account is given of work done at the Orazio Raimondo Floricultural Experiment Station in 1953, namely breeding and selection of carnations, roses, freesias, gladioli, narcissi, nerines, primulas, *Strelitzia reginae*, tulips and crotons; rose rootstock trials; the introduction of tropical and subtropical plants; and insecticide and fungicide trials.

1890. Dickey, R. D., Griffiths, A., Jr., and McFadden, S. E., Jr.
Native and introduced ornamental plants.
A.R. Fla agric. Exp. Stats 1952/53, pp. 106-7.

Continuous-mist propagation. In further tests on this method root-promoting substances gave promise when applied by the concentrated quick-dip method, full sun was generally the most satisfactory light level and rooting was generally rather slow in winter. *Pigmy date palm.* In a test on the effect of 2 storage methods and 4 sowing dates on germination, seeds of *Phoenix roebeleni* stored at room temperature germinated as well as those stored at 45° F. and seeds sown on 3 September and 1 October germinated significantly better, but more slowly, than those sown on 29 October and 26 November. *Tulips.* Bulbs of 3 varieties were cold-stored for 60 and 90 days at 40° F. and then either planted on the day of removal or after a delay of 7, 14, 21 or 28 days. Those planted on and 7 days after removal from 60 days' cold storage flowered equally well, but longer delays in warm conditions significantly reduced flowering. Warm storage of bulbs cold-stored for 90 days seriously reduced flowering compared with immediate planting. [See also *H.A.*, 24: 1795.]

1891. Pasquier, H., and others.
Croquis de jardins. **(Garden design.)**
Jardins d'Aujourd'hui, 1954, Fasc. 12, pp. 357-82, illus.

This number of the journal consists of articles by French landscape architects on formal and informal designs for large and small, town and country gardens.

1892. de Groote, R.
Les substances nuisibles aux plantes dans l'eau d'arrosage. **(Injurious substances in irrigation water.)**
Bull. hort. Liège, 1954, **9**: 354-7.

The ideal water for ornamentals under glass should be soft, with low contents of chlorides, nitrites and nitrates, a pH of 7·5–8·0 and a maximum salts concentration of 1 g./l.

1893. Scurfield, G.
Atmospheric pollution considered in relation to horticulture. A preliminary analysis of the problem.
J. roy. hort. Soc., 1955, **80**: 93-101, bibl. 13.

The author summarizes observations made by himself in Manchester and Sheffield and by Parks Superintendents in other large cities on the tolerance or susceptibility of many ornamentals, including lawn grasses, to atmospheric pollution. Trees and shrubs reported to be tolerant are listed. In addition, he discusses seasonal variations in the distribution of air pollutants, notably sulphur dioxide, and the mechanisms by which they may injure plants. Many points still requiring investigation are indicated.—Bot. Dep., Univ. Manchester.

1894. Jacques, J.-E.
Le gaz et quelques plantes d'appartement.
(Gas and some house plants.)
32nd Rep. Quebec Soc. Prot. Pl. 1950,
pp. 24-6, bibl. 3.

The effect of domestic gas was studied on geranium, coleus, *Saintpaulia* sp., *Nephrolepis exaltata* var. *bostoniensis*, *Aglaonema commutatum*, ivy, *Begonia semperflorens*, *Asparagus sprengeri*, *Crassula obovata*, potato and tomato. The plants were kept in an atmosphere containing 100 p.p.m. of gas for 24 hours. Geranium (*Pelargonium zonale*) showed no reaction immediately after the treatment but later older leaves yellowed and died. *Coleus blumei* showed pronounced leaf epinasty after treatment but were growing normally 44 hours later. Ivy (*Hedera helix* var. Pinoak) showed epinasty of young leaves but normal development was resumed after return of the plants to pure air. After 2 hours in the impure air tomato and potato showed pronounced epinasty; after return to pure air the leaves returned to normal in tomato. There was no reaction to gas in the other plants tested.

Annual and herbaceous plants.

(*See also* 1990b, p, s, 2307.)

1895. Ichihara, J.
Dormancy of the seeds of herbaceous flowers. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **23**: 115-22, bibl. 11.

The seeds of 29 herbaceous flower species studied for 1–5 months after harvesting could be classified into 3 dormancy grades: (1) no dormancy—aster, dianthus, gaillardia, gypsophila and stock; (2) weak dormancy—balsam, calliopsis, cosmos Orange Flare, godetia, helichrysum, kochia, pyrethrum, sweet william and vinca; (3) somewhat stronger dormancy—amaranthus, celosia, cleome, coleus, cosmos, digitalis, euphorbia, pansy, petunia, phlox, portulaca, salvia, snapdragon, torenia and viola. As dormancy broke the percentage and speed of germination increased gradually. In general, freshly harvested seeds had a narrower temperature requirement for germination than older seed. Effective treatments for breaking dormancy were alternating temperatures of 20° C. for 16 hours and 30° C. for 8 hours, pre-chilling, 0·2% nitrate of potash, 0·2% thiourea, light or a combination of these treatments. The nitrate of potash was generally the most effective treatment and the thiourea depressed germination in some cases and produced abnormal seedlings in many others. Light promoted germination in coleus, digitalis, helichrysum and petunia, and depressed it in amaranthus; light selsitivity decreased during storage in both groups.

1896. Zuberbühler, —.
Schlechtes Saatgut erwischt? **(Bad seed?)**
Schweiz. Gärtnerztg, 1954, No. 52, p. 7; 1955, No. 2, pp. 5-6; and No. 3, pp. 4-6, illus.

Following a discussion of factors that affect germination the author presents some data from his own experiments with snapdragon, forget-me-not, pansy, and carnation seed which show that with these plants optimum germination is obtained with seed stored for 2–4 years.

1897. Payne, R. N., and Kays, W. R.
Spring production of China asters in the greenhouse in Oklahoma.
Bull. Okla. agric. Exp. Stat. **B-439,** 1954, pp. 15, bibl. 16, illus.

This bulletin is in two parts. The first part gives recommendations, based on 4 years' trials, for growing China asters (*Callistephus chinensis*) to flower in April, May and early June, and briefly discusses varieties, temperature, sowing and transplanting, soil preparation and sterilization, manuring, supports, spacing, supplementary lighting, and pest and disease control. The second part reviews the literature and describes investigations on supplementary lighting. It was found that if seed were sown early in January the period of additional light (5 hours a day from 5 to 10 p.m.) started when the seedlings emerged must be continued for 8 weeks to produce flowers with sufficiently long stems. Long photoperiods cause axis elongation followed by flower bud initiation, but a reversal to short photoperiods after this stage results in quicker flower development than when long photoperiods are continued up to flowering.

1898. Scholten, G.
Asters. Verwelkingsziekte. **(Wilt disease of asters.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 19-22.

Soil sterilization of 3 different soil areas in 1952 did not reduce infection by *Fusarium* and *Verticillium* spp. Trials in 1953 were aimed at evaluating varietal resistance on wilt-infected soils. At Aalsmeer and Rijnsburg most varieties were heavily infected and no yield data are given. At Heemskerk there were varietal differences; free-flowering varieties showing a low percentage loss from wilt were Struisveerasters [Ostrich Plume], Reine des Halles Leuchtfeuer, red Pompon aster and single mixed asters.

1899. Brown, E. B.
A seed-borne nematode infestation in annual asters.
Nature, 1955, **175**: 178.

A case is described in which *Aphelenchoides ritzema-bosi* was transmitted, not only in debris accompanying seeds, but in the seeds themselves of the annual aster, *Callistephus chinensis*. This is the first record of seed-borne infestation by a species of *Aphelenchoides*. A full account is to be published elsewhere.—N.A.A.S., Cambridge.

1900. Morgan, H. G.
***Napomyza lateralis* (Fall.): a new pest of calendulas.**
Plant Path., 1954, **3**: 85-6, bibl. 3, illus.

In 1949–50 larvae of the fly *Napomyza lateralis* caused injury to marigolds, *Calendula officinalis*, grown in Devon and Cornwall for the winter cut-flower trade. The life history of the fly and the damage it may cause to seedlings, plants or flowers is outlined. The weed groundsel is an important alternate host. Attempts to work out economic control measures have so far been unsuccessful.—N.A.A.S., Starcross.

1901. Scholten, G., Belgraver, W., and Kragtwijk, C.
Amerikaanse anjers. Vergelijking uitval en opbrengst van geënte planten en van planten op eigen wortel bij infectieproeven met *Fusarium* en *Phialophora*. (**Perpetual-flowering carnations. Comparison of loss and yield from grafted plants and plants on their own roots in infection tests with *Fusarium* and *Phialophora*.**)
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 18-19.

After division of a carnation bed into 3, one plot was infected with *Fusarium oxysporum*, a second with *Phialophora cinerescens* and a third was left untreated. In the control plot White Betty Lou grew better on its own roots than when grafted on John Briry. Grafted plants in the *Fusarium* plot remained healthy, but after 2 months there were no survivors among plants from cuttings. In the *Phialophora* plot there was a 56% loss of plants from cuttings and a 38% loss of grafted plants after 6 months. Plants of the variety William Sim succumbed more quickly to *Phialophora* than White Betty Lou or John Briry. Grafting affected yields unfavourably. William Sim raised from cuttings produced twice as many flowers per plant as when grafted, and 4 times as many flowers per plant as when John Briry was used as a rootstock.

1902. Schwabe, W. W.
Acceleration of flowering in non-vernalized chrysanthemums by the removal of apical sections of the stem.
Nature, 1954, **174**: 1022, bibl. 3.

The author replying to a recent letter in *Nature** states that in chrysanthemum var. Sunbeam, flowering laterals often occur on only slightly vernalized plants. A recent experiment awaiting publication has shown that 4 out of 4 slightly vernalized, and 12 out of 24 incompletely devernalized, plants, which failed to bud in their main apices, produced flowering laterals. Both main and lateral apices remained vegetative in the unvernalized controls.—Imp. Coll. Sci. Tech. Lond.

1903. Vince, D.
Some effects of temperature and day-length on flowering in the chrysanthemum.
J. hort. Sci., 1955, **30**: 34-42, bibl. 7.

The responses of 2 chrysanthemum varieties, Charm and Magnet, to day-length and temperature were investigated. A period of low temperature was not found to be necessary for flowering in Charm, in fact the variety flowered most rapidly if kept continuously at temperatures above 60° F. Magnet showed a limited requirement for low temperature. A decrease in number of leaves produced before flower initiation (maximum reduction 8·7) occurred when plants were grown at 40° F. for 4 weeks, compared with plants grown at 60° F. Flowering was not accelerated by this treatment, however, as growth was slower at the lower temperature. A period of 4 weeks at 49·5° F. minimum temperature also reduced leaf number before flower initiation, though less so than the 40° F. treatment, but it did accelerate flowering slightly. With Magnet the effect of subjecting the parent stools to low temperatures was carried over into the cuttings, even though these were produced at high temperatures. Maintaining stools under cool conditions after flowering until the cuttings are taken should, therefore, satisfy any low temperature requirement. In continuous long days (17 hours) from the cutting stage, terminal inflorescence buds formed in both varieties, but they failed to develop to anthesis; apical dominance was lost and vegetative shoots grew out below the terminal buds. The leaf character of Magnet differed in plants grown under long and short days.—Univ. Reading.

1904. Cathey, H. M.
Why use 60° F. night temperature [for chrysanthemums]?
Bull. N.Y. St. Flower Grs, 1954, No. 112, pp. 2-4, bibl. 1, illus.

Chrysanthemum varieties were previously classified on a basis of temperature responses as thermozero, thermopositive and thermonegative [see *H.A.*, 24: 4089]. Three varieties, one in each group, were used in further temperature experiments. Stock plants from which cuttings were taken were grown at 50°, 60° and 80° F., and later, at 3 stages from the time of propagation onwards, batches of plants from each of the stock temperatures were transferred to temperatures of 50° and 60° F. Minimum flowering time was obtained with all 3 varieties when 60° F. was continued throughout the life of the plant. Growing plants at 80° F. in the first phase inhibited flowering in the thermonegative variety and delayed it in the others. An initial temperature of 50° F. delayed flowering slightly in the thermonegative variety and inhibited it in the thermopositive variety. A continuous temperature of 50° F. reduced number of flowers per spray on both the thermonegative and thermozero varieties. Shifting the thermopositive variety from 50° to 60° F. resulted in more flowers per spray than when plants were grown continuously at 60° F. The thermozero variety Shasta flowered in the range 50° to 80° F., but both these temperatures produced an equal delay in flowering as compared with the time taken by plants grown at 60° F.

1905. Robison, R. S., Starkey, R. L., and Davidson, O. W.
Control of bacterial wilt of chrysanthemums with streptomycin.
Phytopathology, 1954, **44**: 646-50, bibl. 19, illus.

It has been found that bacterial wilt of chrysanthemum, due to *Erwinia chrysanthemi*, can be controlled by streptomycin and oxytetracycline. The antibiotics were readily absorbed by, and translocated in, cuttings, and persisted long enough to protect the plants that developed. Absorption and translocation by rooted plants was slower. Streptomycin was applied by holding cuttings in solutions of the antibiotic, planting cuttings and rooted plants in treated sand, and by treating cuttings with hormone powder containing the antibiotic. Streptomycin was only slightly toxic to the plants at the lowest concentration used (50 p.p.m.) when applied in solutions or in treated sand, but showed considerable phytotoxicity at high concentrations (up to 1,000 p.p.m.). Streptomycin was more effective than oxytetracycline, because it provided protection at lower concentrations and was less phytotoxic.—N.J. agric. Exp. Stat., New Brunswick.

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* Vince, D., and Mason, D. T., *Nature*, 1954, 174: 842-3 [see *H.A.*, 25: 819]

1906. MORETON, B. D.
Control of chrysanthemum gall midge.
Plant Path., 1954, **3**: 138.

Dipping chrysanthemum shoots heavily galled by *Diarthronomyia chrysanthemi* in 0·01 and 0·025% parathion and 0·01 and 0·02% γ-BHC suspensions resulted in a high degree of control.—N.A.A.S., Wye.

1907. FJELDDALEN, J.
Angrep av tomatflylarver på krysantemum. (**Chrysanthemum attacked by larvae of *Mamestra oleracea*.**)
Gartneryrket, 1954, **44**: 750-1, illus.

In recent years *Mamestra oleracea* larvae have caused widespread damage to chrysanthemums in Norway. The different types of injury due to feeding of larvae of different ages are described and illustrated. Cinerarias, carnations and cauliflowers are among other crops attacked. The early application of DDT at high concentrations is recommended for control.

1908. HABRAN, R., AND LACROIX, E.
Essais de lutte contre l'anguillule du chrysanthème. (**Trials on the control of chrysanthemum eelworm.**)
Bull. hort. Liège, 1953, **8**: 207-10, 287-91, and 1954, **9**: 81-5.

Many compounds were used in tests to control chrysanthemum eelworm, *Aphelenchoides ritzema-bosi*. The control recommended for pot plants of the Poitevine type is heavy applications of organic phosphorus sprays at fortnightly intervals from the cutting stage until the plants are brought under cover in the autumn, and at the same time dusting with a powder containing derris, copper and sulphur. For control on plants grown for cut flowers, the cuttings should first be soaked in E605, and then sprayed with E605 or parathion throughout the growing season, but particularly from mid-July onwards when the spraying cycle should be not more than 2 weeks. The need for using healthy planting material in all cases is stressed.

1909. BARESI, F.
La lotta contro le anguillule delle foglie dei crisantemi mediante l'insetticida sistemico selettivo "systox". (**Control of the chrysanthemum eelworm with systox.**)
Not. Mal. Piante, 1955, No. 29, pp. 3-7, bibl. 9.

Systox at 0·05% applied at 20 c.c. per plant in late September and again 5 days later gave complete control of *Aphelenchoides ritzema-bosi* in chrysanthemum.—Osserv. fitopat., Sanremo.

1910. MARCHAL, J.
Helleborus. De invloed van lage temperaturen op de bloei. (**The effect of low temperatures on the flowering of *Helleborus*.**)
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 47-9.

Experiments with *Helleborus* showed that a period of cold resulted in more even flowering, provided that this period was not too long. A group of plants given 1 week at −2 to −3° C. were later all marketed on the same day. Cold treatment for 3 or 4 weeks did not give satisfactory results.

1911. COTTA, W. J., Jr., AND HOWARD, F. L.
Black spot of *Helleborus*.
From abstr. in *Phytopathology*, 1954, **44**: 485.

Coniothyrium hellebori is a major limiting factor in the commercial culture of Christmas rose (*Helleborus niger*). Captan was the most effective fungicide of 7 applied to 1- and 2-year-old plants. Phenyl mercury acetate was most toxic to *C. hellebori* conidia and mycelial growth in laboratory tests, but at 1 pt. to 100 gal. of water it injured 1-year-old plants.

1912. LEFERING, T. W.
Bestrijding van wortelaaltjes bij *Helleborus* en *Pyrethrum*. (**Control of eelworms in *Helleborus* and *Pyrethrum*.**)
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 92-3.

Pratylenchus pratensis was effectively controlled by soil fumigation with DD. Plants of *Helleborus niger* and *Pyrethrum roseum* which had been treated with varying concentrations of systox in general made poor growth. The effect of systox for eelworm control cannot yet be estimated.

1913. MUNNECKE, D. E.
Bacterial stem rot and leaf spot of pelargonium.
Phytopathology, 1954, **44**: 627-32, bibl. 11, illus.

This disease, caused by *Xanthomonas pelargonii*, has seriously limited the production of cuttings from field-grown geraniums, *Pelargonium hortorum*, in California for several years. No commercial variety of *P. hortorum* was found to be immune to the stem rot phase but several were resistant to the leaf spot phase of the disease. Several varieties of ivy geranium, *P. peltatum*, were susceptible but the Martha Washington pelargonium, *P. domesticum*, was resistant. The bacteria are carried over from one crop to the next in cuttings taken from infected plants, which may not necessarily have developed symptoms, and in recently infested soil. In the field they may be disseminated by contact and splashing water, but primarily by contaminated cutting knives. Field control measures must be based upon establishing disease-free planting stock, using 1-year rotated fields and following strict sanitary measures. [From author's summary. For a note on earlier work see *H.A.*, 24: 1761.]—Univ. Calif., Los Angeles.

Bulbs and tubers.

(*See also* 1206, 1254, 1644, 1990a, e, l, n, 2303, 2307.)

1914. KIRTON. (N.A.A.S.)
Guide to horticultural experiments 1954, Kirton Experimental Husbandry Farm,
Boston, Lincs, 1954, pp. 12.

Short notes are given on the bulb experiments in progress. A. *Nutritional.* A long-term trial started in 1951 on narcissus (Fortune) and tulips (Rose Copland), the rotation being early carrots, bulbs, summer cabbage, cereal, with different manurial treatments for early carrots and bulbs. B. *Cultural.* Short-term trials on planting, spacing, weed control and cultivation of tulips and narcissi. C. *Pathological.* Trial in progress on effect of fungicidal sprays for tulip "fire" control.

Observation plots are kept to observe residual effects of different treatments.

1915. FRIESDORF.
Tätigkeitsbericht 1953 der Gärtnerischen Versuchsanstalt zu Friesdorf/Bad Godesberg. **(25th Annual Report of the Horticultural Research Station, Friesdorf/Bad Godesberg, 1953)**, pp. 53.

Forcing of gladiolus corms: Corms were kept for 4 weeks in January in a heated store, in boxes through which warm air could circulate. The temperature was kept at 28–35° C., and the atmosphere was dry enough to discourage root extension. Plants from the treated corms, given normal culture, flowered about 2 weeks earlier than usual. *Variety trials* are reported with gladioli, chrysanthemums, and tulips. *Forcing of German and Dutch-grown tulips:* There was little difference in the quality of pre-cooled and untreated bulbs of forcing varieties from the two sources.

1916. WASSCHER, J.
Begonia. Vergelijking molm, molmig goed en bagger. **(Begonia. Comparison of peat, peaty material and dredgings.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, p. 25.

Soil mixtures were made using peat, peaty material, and dredgings with artificial fertilizer or farmyard manure, and their effect on growth of begonia varieties studied. Exquisite produced more flowers, branches and leaves in the peat and peaty material mixtures than in the dredgings mixture. Nelly Visser produced most flowers in the dredgings mixture but leaf and branch numbers were greatest in peaty material. The effects of farmyard manure and artificial fertilizer were variable.

1917. WASSCHER, J.
Begonia. Bloeivervroeging door kortedagbehandeling bij Lorraine-begonia's. **(Begonia. Forcing of Lorraine begonias by short-day treatment.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 24-5.

Short-day treatment was given to young plants of Ege's Favorite and Solbacken for 3 or 4 weeks during July and August. Plants which received treatment starting at the beginning of July were in full bloom in the first week of September, and their flower number was appreciably higher than that of plants treated in late July and August, which flowered at the end of September. The forced plants were somewhat smaller than control plants.

1918. BOSSE, G.
Die Knospenfäule bei Cyclamen. **(Bud rot of cyclamen.)**
Gartenwelt, 1955, **55**: 40, illus.

Prophylactic dusting with "B 500", a proprietary compound with specific action against *Botrytis cinerea*, prevented bud rot in cyclamen. The chemical was applied close to the corms with a hand duster to which a long tube had been attached. An early application of "B 500" also succeeded in preventing an outbreak of bud rot (*B. cinerea*) in hydrangea. The composition of the chemical is not stated.—Gärtn. Versuchsanst. Friesdorf.

1919. SCHOLTEN, G.
Cyclamen. Meeldauwbestrijding. **(Mildew control on cyclamen.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 35-6.

Mildew on cyclamen flowers, chiefly on Perle von Zehlendorf, was caused by *Oidium cyclaminis.* An actidione spray at 50 c.c. per sq. m. gave good control but damaged the flowers.

1920. SCHOLTEN, G.
Cyclamen. Groeistilstand door te sterke Gesafidbespuiting. **(Growth in cyclamen arrested by too strong Gesafid sprays.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 37-8.

Tests with Gesafid (a DDT material) showed that concentrations above 1% killed adult leaves and scorched new growth of young cyclamen plants. At 0·3% no adult leaves were killed but new growth was inhibited; a spray of 0·15% did not damage plant growth.

1921. CIFERRI, R.
Virosi delle freesiae in Italia. **(Viruses of freesia in Italy.)** [English summary 5 lines.]
Not. Mal. Piante, 1955, No. 29, pp. 26-9, bibl. 1.

It is thought that both phaseolus virus 2 and freesia virus occur in Italy on freesia. Virus symptoms in freesia are described. The Buttercup variety is relatively resistant and Snow White is susceptible.—Lab. crit. Osserv. Mal. Piante, Pavia.

1922. CERUTI SCURTI, J.
Le colture industriali dei gladioli e le malattie che le insidiano. **(Gladioli: commercial culture and diseases.)** [English summary ½ p.]
Ann. Sper. agrar., 1955, Vol. **9**, No. 1, Suppl. pp. xcvii-cvi, bibl. 34.

Information is given on acreages under commercial cultivation in different parts of Italy, seasonal prices for different colours and types, and the following diseases and their control: yellows (*Fusarium orthoceras* var. *gladioli*), dry rot (*F. oxysporum* var. *gladioli*), storage rot (*Penicillium gladioli*), hard rot and leaf spot (*Septoria gladioli*), core rot (*Botrytis gladiolorum*), smut (*Tuburcinia gladioli*), scab (*Pseudomonas marginata*), mosaic and a disease, probably of virus origin, that affects the Picardy variety.

1923. HATTINGEN, R.
Blasenfussschaden an Gladiolen. **(Thrips injury to gladiolus.)**
Gartenwelt, 1955, **55**: 13-14, illus.

In 1954 *Taeniothrips gladioli* [*T. simplex*] caused heavy damage to gladiolus plantings at Neustadt/Weinstrasse in spite of cold and moist weather. Symptoms and control measures (parathion and/or DDT) are discussed.

1924. ROYAL HORTICULTURAL SOCIETY.
The lily year book 1955, No. 18.
R.H.S., London, 1954, 9×5½ in., pp. 155, illus., 10s.+9d. postage or U.S. $1.65 post free.

In addition to 3 papers abstracted below this year book contains articles on some North American lilies, work at the Boyce Thompson Institute on hybrids of *L. auratum*×*L. japonicum* and *L. rubellum*, and on lilies found in California, and notes on *L. auratum rubrum*, *L. wardii* and the newly described epiphyte *L. arboricola* as well as many other items of interest to lily growers, both professional and amateur.

1925. Brock, R. D.
Fertility in *Lilium* hybrids.
Heredity, 1954, **8**: 409-20, bibl. 10, illus.

The several ways in which sterility may occur in lily hybrids are examined. In self-sterile species pollen tube growth is normal and the sterility mechanism seems to operate at or after fertilization.—John Innes hort. Instn.

1926. Calvert, A.
Experiments on the propagation of *Lilium regale*.
R.H.S. Lily Year Book 1955, 1954, No. 18, pp. 47-52.

Experiments are described which provided comparisons between 4 different germination media, 2 different dates of pricking out, 3 pricking-out composts and 3 different composts both for potting-off and potting-on. From the results it is concluded that the following cultural sequence would be suitable for *Lilium regale* in England: Sow in March using John Innes Seed Compost (JIS) and prick out into J.I. Potting Compost No. 1 (JIP1) as soon as the seed leaves have straightened, using 3-in. boxes with 30 plants per box. Pot off into 3-in. pots using JIP1 early the following spring and one year later pot on into 4½-in. or 6-in. pots using the same compost. The formulae of the composts are given.—John Innes hort. Instn.

1927. Findlay, T. H., and Ellis, A.
A method of propagating lilies from scales.
R.H.S. Lily Year Book 1955, 1954, No. 18, pp. 43-6, illus.

The method employed in Windsor Great Park to propagate large numbers of lilies from scales is described. Only scales that come away freely without damaging the parent bulb are used. They are best taken in August and September and are set in a propagating frame in a glasshouse without bottom heat. The frame contains successive layers of crocks, 4 in. of coarse leaf soil, 2½ in. of potting soil, 1 in. of a 50-50 silver sand-peat mixture and, on top, 1 in. of silver sand. Temperatures are maintained between 45° and 50° F. Plants can usually be potted in December and transferred to cold frames in April. The types of lily successfully propagated in this way are indicated.

1928. Bakker, J.
Lelies. Selectie, vergelijking 3- en 4-jarige bollen en bewaring bij *Lilium regale*. **(Selection, comparison of 3- and 4-year-old bulbs and storage of *Lilium regale*.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 52-6.

Five types of lily plant, selected in the field, were studied for their forcing properties. In general the best flowering was obtained from those types with small leaves. Coarse leaves, a tendency to whorled phyllotaxy and a leafless upper stem indicated poor forcing quality. Forced flowering from 3- and 4-year-old bulbs of 3 sizes was compared. The average number of flowers per stem was higher in the 4-year-old bulbs. In both groups the biggest bulbs gave the longest stems and the most flowers. The smallest 3-year-old bulbs produced more flowers than the smallest 4-year-old bulbs. In storage tests it was shown that the forcing time was shortened with later planting, but average stem length and flower number per stem was reduced after long storage periods, and the number of split and misformed flowers increased. Deterioration of the bulbs was least among those stored in moist peat and greatest in those stored under dry conditions.

1929. Slate, G. L.
Mulching lilies.
R.H.S. Lily Year Book 1955, 1954, No. 18, pp. 72-5.

The author advocates the use of organic mulches on lilies, and in particular outlines the advantages to be derived from the use of sawdust. Both hard- and softwood sawdusts, whether fresh or rotted, are suitable. They may be applied at any time when the soil is not very dry. An inch is sufficient for moisture conservation, but 2, and preferably 3 or 4, inches are better for suppressing weeds. Supplementary nitrogen may have to be applied at a rate of up to 2% of the weight of dry sawdust.—N.Y. St. agric. Exp. Stat., Geneva.

1930. Scholten, G.
Lelies. Uitval door *Fusarium* bij zaailelies. **(Loss due to *Fusarium* in lily seedlings.)**
Bakker, J.
Lelies. Uitval bij jong plantgoed door *Fusarium oxysporum* bij L. "White Superior". **(Loss of young plants of White Superior lily through *Fusarium oxysporum*.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 56-8 and 58-9.

Seedlings of *Lilium formosanum* var. White Superior were shown to be very susceptible to infection by some strains of *Fusarium oxysporum*. A strain from asters gave almost total infection, while a strain cultured from *Lilium rubrum* had no effect. Young plants of White Superior were grown in 3 soils, viz. infected, sterilized and fresh soils. After 4 months growth the loss of plants in infected soil was 56·5%, in fresh soil 40·5%, and in sterilized soil 29%. Plants in sterilized soil were darker green than the others.

1931. (Jensen, H.)
Lily nematode control.
Amer. Nurserym., 1954, **100** (11): 24.

Various treatments designed to control nematodes in lily planting stock were compared at Oregon State College. Root pruning and hot water treatments appeared to be equally successful with bulbs forced in the greenhouse, there being no difference in the size of the plants, size of the root systems, time of flowering or number of blooms. Soaks and dips showed some promise but are too hazardous to be recommended. Root pruning removed about 86% of the nematodes. On the basis of these trials root pruning as close to the basal plate as possible, followed by a Spergon dip of standard concentration, is recommended.

1932. Royal Horticultural Society.
The daffodil and tulip year book 1955, No. 20.
R.H.S., London, 1954, 9×5½ in., pp. 140, illus., 10s.+9d. postage or U.S. $1.65 post free.

A large number of articles in this edition of the Year Book are concerned with the breeding and showing of new daffodil varieties in Britain, New Zealand and the U.S.A. New Dutch tulip hybrids from *Tulipa greigii*, *T. tubergeniana* and *T. marjolettii* are described, and an article on tulip cultivation is also included.

1933. Shepherd, F. W., and Parkins, M. C.
Effects of cold weather on daffodils at Rosewarne, 1954.
R.H.S. Daffodil and Tulip Year Book 1955, 1954, No. 20, pp. 85-7.

Unusually low temperatures which were experienced in Cornwall at the beginning of 1954 caused quite severe damage to several daffodil varieties. The varieties and the extent of damage are indicated. Apart from the Tazetta groups there seemed to be a close relation between time of flowering and frost damage, earlier flowering varieties suffering more than later ones; damage did not appear to be related to varietal resistance or susceptibility.

1934. Toyoda, T., and Nishii, K.
Studies on forcing tulips for export. II. Effects of high temperature. [Japanese, with English summary 16 lines.]
J. hort. Ass. Japan, 1954, **23**: 127-36, bibl. 7, illus.

The effects of forcing 2 tulip varieties at 30°, 35° and 40° C. with and without ventilation were studied. Compared with non-ventilation, ventilation delayed flower bud differentiation but advanced flowering. The higher the temperature the earlier the flowering and the more numerous the blind bulbs. 35° C. for 1 day was the best temperature for Feu Brilliant. For William Pitt 40° C. for 1 day or 35° C. for 1 day followed by 40° C. for a second day gave the best results. Bulbs thus treated bloomed 10 days earlier than the controls. [For Part I see *H.A.*, 25: 848.]

1935. Florenchie, —., and Theau, —.
Le développement du *Strelitzia reginae*. **(The growth and development of *Strelitzia reginae*.)**
Rev. hort. Algér., 1954, **58**: 228-32, illus.

The morphology of *Strelitzia reginae* is compared and contrasted with that of *S. augusta*. A description is given of the structure and development of the rhizome and of flower production.

Lawns.

(*See also* 1491, 2228, 2298.)

1936. Buzacott, J. H.
Effect of maleic hydrazide on grass growth.
A.R. Qd Bur. Sugar Exp. Stats 1953/54, 1954, p. 49.

A trial with MH was carried out on two grasses, blue couch (*Cynodon dactylon*) and Mackey's couch (*Chrysopogon acicularis*). Spraying was done during the wet season when the grasses were in a state of rapid growth. Solutions used ranged from 0·2 to 1·6% applied at the rate of 100 gal. per acre. The heavier applications delayed the growth of blue couch but scarcely to a stage where the chemical could be used as a substitute for mowing. On Mackey's couch, however, it produced spectacular results. This grass seeds prolifically and all treatments except the lowest inhibited seeding for several weeks whilst the higher treatments maintained the lawn in a condition which did not require mowing for at least two months. [For another account of these trials see abstract 2228.]

1937. Harding, G. F., and Eaton, G. O. P.
Observations on the use of maleic hydrazide.
J. Pk Adm., 1955, **19**: 371-5, bibl. 15.

In a series of trials involving lawn grasses, coarse grasses and road verges the triethanolamine salt of maleic hydrazide was applied as a spray at rates of 4 lb. and 6 lb. actual MH per acre in 40 to 100 gal. water. The grasses were subsequently mown. Both rates effectively retarded the growth of grasses especially where cutting was postponed until 10 days after spraying, but at the 6-lb. rate fine grasses suffered some injury when applications were made during dormancy or during drought. There was no evidence of varietal differences in the response of grasses to MH. The addition of 2,4-D to MH did not affect the response of grasses to MH and the 2,4-D remained fully effective against broadleaved weeds. MH alone retarded the growth of some of these weeds but encouraged unaffected species to increase their hold.

1938. Howard, F. L., and Champlin, B.
Vulnerability of *Rhizoctonia solani* in relation to turf brown patch control.
From abstr. in *Phytopathology*, 1954, **44**: 493.

Inconsistent results with fungicides for controlling brown patch of bentgrasses stimulated a study of the toxicity of chemicals and biological activity of antagonistic fungi against mycelium and sclerotia of *R. solani*. In laboratory tests mycelia were killed only by mercury chlorides and sclerotia only by cadmium-chromium mixtures, while thiram was ineffective. Cadmium-chromium mixture is apparently selectively fungitoxic to *Rhizoctonia* but not to its antagonists. Whereas mercury chlorides are specific for *R. solani* hyphae attacking bentgrass foliage, watering the turf prior to application of certain fungicides is required for effective prevention of brown patch.

1939. Schread, J. C.
Control of the Japanese beetle and the Asiatic garden beetle.
Circ. Conn. agric. Exp. Stat. **184**, 1953, pp. 10, illus.

Extensive experiments were carried out over a period of 6 years on control of larvae of the Japanese beetle (*Popillia japonica*) and the Asiatic garden beetle (*Autoserica castanea*) in turf. Chlordane, aldrin, dieldrin, heptachlor, DDT and methoxychlor all proved effective and persistent. Parathion, metacide, BHC and toxaphene had less good residual effects. Treatments may be made at any time when the ground is not frozen but preferably before 15 May or after 1 August and before rain or watering.

Succulents.

1940. Roan, H. M., and Rowley, G. D. (Editors).
Repertorium plantarum succulentarum No. 4, 1953.
British Section of the International Organization for Succulent Plant Study, "Tree Tops", Church Lane, Adel, Leeds 6, [1954], pp. 13.

In a short editorial, in English, German and French, the editors emphasize that this publication and its predecessors are "intended solely as books of reference to all that has been published and are not in any way meant to give validity to any invalidly published name or to indicate a preference for one name over another". To make this purpose clearer the two divisions are now entitled *Descriptiones novae* and *Combinationes novae* instead of *Repertorium* and *Synonymy* respectively. The references are arranged by genera under their families and should be of great assistance to anyone wishing to keep abreast of developments in the systematic botany and nomenclature of the succulents. The majority of the papers listed were published in 1953, but additions to earlier lists are also included.

1941. Schwabe, W. W.
The effects of light intensity on the flowering of *Kalanchoe blossfeldiana* in relation to the critical daylength.
Physiol. Plant., 1954, **7**: 745-52, bibl. 20.

The relation between light intensity and flowering in *Kalanchoe* was investigated in experiments in which only part of the daily light period was given as low intensity illumination in a 24-hour cycle. The results indicate that *Kalanchoe* plants receiving such reduced light treatment require a longer dark period in order to attain the same degree of flowering as controls kept in full daylight throughout. This effect, suggesting a shift in the critical daylength, is discussed in relation to prior work and current theories of photoperiodism. [Author's summary.]—Imp. Coll. Sci. Tech., London.

*Roses.**

(*See also* 1854, 1887h, i, j, 1959, 1990d.)

1942. Wylie, A. P.
The history of garden roses.
J. roy. hort. Soc., 1954, **79**: 555-71, illus., 1955, **80**: 8-24, 77-87, bibl. 49.

This survey covers ancestral species, early garden roses and, in detail, the origins of the many classes of rose that are now found in gardens. By far the most important factor involved in their evolution has been interspecific hybridization and more recently hybridization between the different groups formed from the earlier crosses. Polyploidy has also played a significant role in some classes. Some of the ways in which future progress may be attained are indicated; they include the need for more basic information on rose genetics, the causes of sterility and rootstocks.—Dep. Bot., Univ. Manchester. [See also *H.A.*, 23: 1090i.]

1943. Coste, —.
Le rosier—porte-greffes—variétés. **(The rose [in Algeria]: rootstocks and varieties.)**
Rev. hort. Algér., 1954, **58**: 221-7.

Roses are grown commercially as well as privately in various parts of Algeria and do best in the coastal and Sahel regions. *Rosa major indica* is the rootstock principally used but the local *Rosa sempervirens* shows promise. Suitable varieties of hybrid tea, wichuriana rambler, polyantha and hybrid polyantha are listed. Brief notes are given on pruning and manuring.

1944. Oliver, R. W.
Garden rose growing.
Publ. Canada Dep. Agric. **908**, 1954, pp. 15, illus.

The chief rootstocks used in Canada are *Rosa canina* or briar and *R. multiflora*, the former being preferable as giving a longer lived plant once it has become established, ripening earlier in autumn and hence less liable to winter injury. *R. multiflora* is more vigorous and quick to start. Cultural details are given.

1945. Strømme, E., and Falk, K.
Roser i gruskultur. **(Gravel culture of roses.)**
Gartneryrket, 1954, **44**: 513-16, bibl. 2, illus.

In 6 years' trials Better Times and Rapture roses grown in gravel culture produced 3 more flowers per plant per year than plants grown in soil culture. In the case of Rapture flower quality was also superior in gravel. The authors come to the conclusion that the soilless culture of roses is economically feasible under Norwegian conditions.—Norwegian Coll. Agric.

1946. Rodrigo, P. A., and Seggay, L. V.
The culture and propagation of roses in the Philippines.
Philipp. J. Agric., 1953 (issued 1954), **18**: 145-68, bibl. 12, illus.

Subjects discussed include varieties of bush and climbing roses grown in the Philippines, propagation, culture, and the control of pests and diseases.

1947. Rupprecht, H.
Wundheilungs- und Verwachsungsvorgänge bei Winterveredlungen von Edelrosen. Vergleichende Untersuchungen unter besonderer Berücksichtigung des Einflusses verschiedener Unterlagen auf den Ertrag bei der Kultur unter Glas. **(The processes of wound healing and union of winter-grafted roses. Comparative studies under certain conditions of the influence of different rootstocks on the yield of roses under glass.)**
Arch. Gartenb., 1954, **2**: 385-440, bibl. 91, illus.

Yield variations of grafted roses under glass were studied from the point of view of the anatomical characteristics of the graft partners. Scions of Better Times and Geheimrat Duisberg were grafted on *Rosa manettii*, *R. canina*, *R. canina* Senff, *R. odorata* and *R. pollmeriana*. The grafts were examined at intervals, starting 2 days after grafting, for 9 months. There appeared to be no differences in the process of union with different rootstocks which might have affected flowering. Geheimrat Duisberg on *R. manettii* showed some delay in forming a union, but then developed without trouble. Differences in the callusing ability of the 2 varieties had no effect on actual union. All combinations produced vessels in the union zone, depending on the least number present in either partner. There appeared to be a relation between yield capacity and the number of rootstock vessels, highest yields occurring in those varieties with vessel number most nearly corresponding with that of their rootstock. Weak flowering appeared to be associated with either incompatibility or wide anatomical differences. The presence of isolating parenchymatous tissue between stock and scion was observed in incompatible combinations. *Rosa canina* was shown to be an unsuitable stock for most glasshouse roses; *R. manettii* was not suitable for H.T. varieties bred from *R. pernettya*. Most grafting losses were caused by *Coniothyrium fuckelii*, to which *R. odorata* and *R. manettii* were most susceptible.

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* Correction.—Please note that Smith's *Rose Growing in South Africa*, reviewed in *H.A.*, 25: 1153, is obtainable at the English published price of 19s.+1s. postage from Gordon & Gotch, Farringdon Street, London.

1948. CORNUZ, L.
Attachage des écussons: raphia . . . ou élastique? **(Raffia or elastic for binding shield buds?)**
Rev. hort. suisse, 1955, **28**: 9-10, illus.

The use of elastic in rose budding was shown to save an average of 20% of the grafter's time compared with raffia-tying. Other advantages of elastic as binding material are that it does not decay, keeps contact between stock and scion without penetrating into the bark, and can be quickly removed after union.

1949. MAHLSTEDE, J. P.
Shipping roses in polyethylene wraps.
Amer. Nurserym., 1955, **101** (2): 7, 92-8, illus.

Methods of packing bare-root or root-wrapped plants in polyethylene, with or without waxing the shoots, are described [see also *H.A.*, 25: 806]. Roses which were root-wrapped in a moist packing material enclosed in 60 lb. 1½-mil. polyethylene paper and with the shoots also covered with a 1½-mil. polyethylene bag showed field survival similar to that obtained from root-wrapped, waxed plants.—Iowa St. Coll.

1950. RICH, S.
Control of *Botrytis* sp. on stored roses.
From abstr. in *Phytopathology*, 1954, **44**: 503.

Of more than a dozen fungicides tested in 1953 for the control of *Botrytis* sp. on dormant rose bushes held in storage for 2 months at 35–45° F. and 80% R.H. only pentachloronitrobenzene as a 20% dust inhibited the growth of the fungus. In 1954 only Vancide 51 was tested. It was applied 5 times at fortnightly intervals as a 1% spray during storage. At the end of the storage season only 5% of the treated plants showed active *Botrytis* growth compared with 44% in the controls.

1951. WATSON, D. P.
Study effects of mulching.
Amer. Nurserym., 1954, **100** (11): 36-7.

Ground corncobs were applied as follows to rose bushes planted in clay loam: (1) as a 2 in. mulch, (2) as a 4 in. mulch, (3) mixed with soil at the rate of 10% by volume, (4) mixed with the soil at the rate of 20% by volume. One plot was left untreated as control. Application of corncobs by any of the methods tested resulted in rapid reduction of the nitrate concentration in the soil. The mulches caused reduced oxygen diffusion, but better aggregation of soil particles, better moisture retention and a lower and more uniform soil temperature during the summer months. Reduction in nitrate and oxygen supply was only a temporary effect. Growth of the mulched plants was reduced during the first few months but thereafter it was much better than that of the controls. Quantity and quality of flowers was also greatly increased by the use of corncobs, either as a mulch or as a soil mixture.—Mich. St. Coll.

1952. BUTTERFIELD, N. W.
Roses affected by mercury compounds in greenhouse paint.
Flor. Exch., 1954, **123** (18): 14.

Evidence is presented indicating that injury observed on roses in newly painted greenhouses was caused by mercury vapours emanating from the paint.—Univ. Mass.

1953. ANDREASEN, R. C.
Mercury injury.
Bull. N.Y. St. Flower Grs, 1954, No. 110, p. 1.

The use in greenhouses of paints containing organic mercury to prevent mildew growth or pentachlorphenol as a wood preservative should be avoided, as both are toxic to plants. Roses are particularly susceptible to mercury injury.

Other trees and shrubs.

(*See also* 1990f, g, i, j, k, o, q, r, t, 2308.)

1954. HESS, C. E., AND SNYDER, W. E.
Interrupted mist found superior to constant mist in tests with cuttings.
Amer. Nurserym., 1954, **100** (12): 11-12, 82, illus.

In experiments at Cornell University, 2 types of interrupted mist, one controlled by an electronic "leaf" (an inexpensive device consisting of a small piece of plastic with 2 contact points; when a film of water forms between the contacts the mist is turned off and as the film starts to dry it is turned on again) and the other by a time clock, were compared with constant mist for the propagation of cuttings from various ornamental shrubs. Cuttings propagated in interrupted mist rooted faster and had better root systems than those propagated in constant mist. The percentage rooting within 23 days for Regel's privet was as follows: constant mist 73, time regulated 87, electronically regulated 93. The reason for the better rooting under interrupted mist was that less water was used so that the temperature of the medium remained closer to the optimum for rooting (78° F.). With the electronically controlled mist even less water was used than with the time controlled mist and there was less variation in temperature. The use of interrupted mist also allowed the cuttings to be hardened off gradually when they began to root. Moreover, as less water was used, the cost of the mist operation was reduced and the drainage problem was practically eliminated.

1955. SHUGERT, R.
Outdoor propagation under constant mist in Missouri.
Amer. Nurserym., 1955, **101** (2): 13-14, 48-9, illus.

Reduction in rotting and improvement in rooting occurred when vermiculite was used instead of sand for rooting hormone treated cuttings under constant mist.

Turning the fog lines on from about 8.30 a.m. till sundown provided optimum conditions for rooting of most species, but it was found that slow rooting plants such as *Juniperus* and *Taxus* may give better results when propagated in the winter under glass. Rooting itself was generally satisfactory, but losses occurred when the plants were transplanted into John Innes compost, and it is thought that the compost may have been too strong for some tender rooted softwood cuttings. In 1954, using 49,000 cuttings, best results were obtained with 5 *Euonymus* spp. and one species each of *Buxus*, *Berberis* and *Salix*. *Pyracantha*, *Rhus* and *Juniperus* were unsatisfactory.

1956. ANANDARAMIAH, M. R.
The role of plastics in plant culture.
Mysore agric. J., 1954, **30**: 82-90, bibl. 9, illus.

In the course of a review it is mentioned that polyethylene film has been used successfully in marcotting crotons and *Ficus benjamina* at the Government Botanic Gardens, Lalbaugh, Bangalore.

1957. HESS, C. E.
Black mold appears on evergreens.
Amer. Nurserym., 1954, **100** (8): 36-7, illus.

In 1953 black mould, caused by *Chalaropsis thielavioides*, appeared on newly grafted *Cryptomeria*, *Ilex*, *Juniperus* and *Thuja* plants. It prevented callus formation and caused graft failure. This is the first time that black mould has been known to cause graft failure in evergreens. At present there is no satisfactory means of control once the fungus has become established in the nursery, but fungicide tests are being carried out.—Cornell Univ., Ithaca, N.Y.

1958. MAHLSTEDE, J. P.
Handling evergreens for shipment.
Amer. Nurserym., 1954, **100** (8): 12-13, 88-92, illus.

Various methods of packaging evergreen nursery trees were tested in an attempt to reduce transport costs and improve survival. In the case of large plants, the use of polyethylene root bags or vinyl resin foliage sprays significantly increased survival of bare-root specimens. All plants which had been balled and burlapped, however, survived irrespective of whether polyethylene bags or foliage sprays were used. Survival was not affected by the type of paper used to line the shipping container. In the case of small plants (12–24 in. high), shipped during warm weather, the use of an over-all polyethylene bag and an outer 60-lb. Kraft wrap round individual plants, foliage-dipped in fungicide solution, gave 100% field survival. The omission of Kraft paper resulted in crushing. A polyethylene root bag together with 1½ mil. 60-lb. polyethylene Kraft paper also gave excellent results. A root dip of 4% Methocel solution did not dry readily, made packaging difficult and resulted in mould growth. Shipping costs for polyethylene-packed plants were lower than those for plants packed by the standard method of moist shingletow, impregnated paper and Kraft. For combined packs of mixed conifers the 60-lb. 1½ mil. polyethylene Kraft and the sealed 1½ mil. polyethylene tube together with 40-lb. Kraft were both significantly better than the standard pack. Placing cheesecloth bags of paradichlorobenzene or activated charcoal in the centre of the pack increased survival.—Iowa St. Coll.

1959. PRIDHAM, A. M. S., AND HSU, R.
Defoliation of nursery stock with copper salts and endothal.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 215-19.

Temperatures below 60° F. reduce the effectiveness of many defoliants, but, when copper sulphate was added to endothal and treatment was carried out at a low temperature (50° F.), improved defoliation resulted in Better Times and Cavalcade roses, *Ligustrum ovalifolium* and several other species of shrub but not hibiscus.—Cornell Univ., N.Y.

1960. PRIDHAM, A. M. S., AND HSU, R.
Screening tests of defoliants for nursery stock.
Proc. 8th annu. Mtg N.E. Weed Control Conf. 1954, New York, pp. 221-6, bibl. 4.

Results of tests conducted at Cornell show that ethylene, acetylene and carbon monoxide induce defoliation in *Ligustrum ovalifolium*. The growth regulators NAA and maleic hydrazide, applied prior to defoliation treatment, delayed leaf fall. The extent of the delay in abscission was related to both the amount of growth regulator and to the amount of defoliant. High auxin level in the abscission zone also delayed leaf fall, which always began with the older leaves.

1961. NONNECKE, I. L.
A study of climatological influence on plant growth in the Lethbridge area.
Rep. Proc. 10th annu. Mtg west. Canad. Soc. Hort. 1954, Saskatoon, Sask., pp. 109-13.

In the plains of Southern Alberta exposed to Chinook winds in winter trees and shrubs are generally found growing naturally only in fairly sheltered areas. Indigenous trees and shrubs found under these conditions are listed as are introduced ornamental trees and shrubs which have proved hardy, variable in hardiness or sensitive.

1962. LARCHER, W.
Die Kälteresistenz mediterraner Immergrüner und ihre Beeinflussbarkeit. **(The cold resistance of Mediterranean evergreens and the extent to which it can be modified.)**
Planta, 1954, **44**: 607-35, bibl. numerous, illus.

The cold resistance of leaves of many evergreens from the northern boundary of the Mediterranean region was tested experimentally at different seasons. In winter three hours' exposure to temperatures of −7 to −18° C. (according to species) did not cause any injury to the plants studied; these results are in agreement with observations made in the Mediterranean area itself. As summer approached susceptibility was found to increase, so that with most plants injuries occurred at temperatures below −4 to −5° C. As the seasonal variations in frost resistance were not accompanied by variations in osmotic pressure, the greater hardiness in winter must be primarily attributed to a plasmatic factor. Cold treatment applied in summer failed to harden the plants; from this it is concluded that in evergreens, as in deciduous trees, frost resistance is confined to the dormant period. Four days' exposure to 20° C. in January had the effect of increasing tenderness in all but two of the experimental plants, but in no case was the level of frost resistance reduced to that found in summer.—Univ. Innsbruck.

1963. Walker, J., and others.
Zonation of shrubs.
Rep. Proc. 10th annu. Mtg west. Canad. Soc. Hort. 1954, Saskatoon, Sask., pp. 92-3.

Twigs were collected in February, 1954, from one relatively winter hardy and one relatively tender species belonging to 7 genera and were subjected to electrical conductivity tests. The results suggest that the tests may be of use in comparing the relative winter hardiness of species within a genus but not in comparing the relative hardiness of different genera.

1964. Siminovitch, D., and Briggs, D. R.
Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. VII. A possible direct effect of starch on the susceptibility of plants to freezing injury.
Plant Physiol., 1954, **29**: 331-7, bibl. 8, illus.

A decrease in starch content and an increase in soluble sugar content in living bark cells of black locust, *Robinia pseud-acacia*, were observed to coincide with low autumnal temperatures. Some increase in frost hardiness was observed during this starch-sugar content change. It is suggested that starch granules serve to enhance the stress and distortion effects in cells dehydrated in the process of freezing.—Univ. Minnesota, St. Paul.

1965. Ewart, M. H., Siminovitch, D., and Briggs, D. R.
Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. VIII. Possible enzymatic processes involved in starch-sucrose interconversions.
Plant Physiol., 1954, **29**: 407-13, bibl. 30.

The role of phosphorylase in sucrose and starch interconversion was studied in black locust trees, *Robinia pseud-acacia*. The observed ratios of inorganic phosphate to glucose-1-phosphate in living bark tissues throughout the growing season were unfavourable to starch production. Artificially stimulated starch synthesis was strongly inhibited when inorganic phosphorus was added to the stimulant glucose-1-phosphate, and it is suggested that such a synthesis is an abnormal reaction. It is concluded that phosphorylase is not involved in starch synthesis or in its conversion from sucrose.—Univ. Minnesota, St. Paul.

1966. Clower, D. F., and Matthysse, J. G.
Phytotoxicity of insecticides in mist concentrate type formulations.
J. econ. Ent., 1954, **47**: 735-8, bibl. 2.

Several types of mist blower formulation were tested for phytotoxicity on a number of woody ornamentals. The insecticides giving the most injury were malathion, lindane, heptachlor and chlordane. DMC was the most phytotoxic acaricide. The insecticides giving the least injury were isodrin, aldrin, dieldrin and DDT. Chlorobenzilate and compound 923 were the least harmful acaricides. The phytotoxicity of an insecticide or acaricide varied with plant species. Oil solutions using Sovaspray 100 as the carrier gave equal or less injury than water emulsions containing the same quantity of toxicant and solvent. [From authors' summary.]—Cornell Univ.

1967. Dressler, H.
Verkürzte Kulturzeit bei Azaleen. (**Shortened growing period of azaleas.**)
Gartenwelt, 1954, **54**: 400.

Plants of the variety Schäme were retarded so that they flowered in July and August. After spending the summer outside, the plants were potted up and kept at 8–10° C. At this temperature, with the seasonal decrease in light intensity, their development was slowed down. In mid-December the plants were topped, so that with the increasing light intensity of early spring new growth and branching were encouraged. When they had reached a satisfactory vegetative condition the temperature was raised to maintain a night temperature of 18° C. for 60 days to allow for flower bud initiation. The plants were put outside at the beginning of June, when the average night temperature was 10–12° C. Flowering started in mid-July.

1968. Griffiths, A., Jr., and Gammon, N., Jr.
Culture and classification of camellia and related genera.
A.R. Fla agric. Exp. Stats 1952/53, p. 110.

In attempts to enhance rooting response, preliminary tests were made with three root-promoting substances and two nutrient supplements applied to *Camellia japonica* cuttings before setting them in a continuous-mist propagator. 2,4,5-T plus monopotassium phosphate gave very good results, but differences were not great and some controls rooted almost as well. The nutrient treatment alone gave a better rooting response than the root-promoting substance or the combination. The best medium tested for continuous-mist propagation of camellias consisted of equal proportions of pine sawdust and vermiculite.

1969. C., J. L.
Inarching *Camellia reticulata*.
Nat. hort. Mag., 1954, **33**: 280-1, illus.

C. reticulata often fails to form a union when grafted or budded on *C. japonica* stocks owing to excessive callusing of the latter. This difficulty can be overcome by inarching [approach-grafting], making cuts about 3 in. long, wrapping the graft in polythene film and holding it in place with budding tape.

1970. Leslie, W. R.
Propagation of cotoneaster.
Rep. Proc. 10th annu. Mtg west. Canad. Soc. Hort. 1954, Saskatoon, Sask., p. 88.

At Morden Experimental Station seed of *Cotoneaster* spp. does not usually germinate until the second year, although there have been cases, apparently depending on seasonal conditions, of good germination in the spring following August sowing. In general the following procedure appears favourable to a high percentage germination: pick on the green side, wash out, treat with concentrated sulphuric acid for 10–90 mins, stratify in damp, acid peat until October or sow shallowly at once in a sheltered frame, do not allow seeds to dry out at any time, and keep filtered shade over seed-frames until August. Propagation by layering and greenwood cuttings is also practicable. Cuttings taken in June and treated with growth substances have shown about 40% strike by July.

1971. Kosugi, K., and Yoshida, S.
Studies on flower bud differentiation and development in some ornamental trees and shrubs. III. On the time of flower bud differentiation in *Daphne odora* Thunb. and *Osmanthus aurantiacus* Nakai. [Japanese, with English summary 5 lines.]
J. hort. Ass. Japan, 1954, **23**: 123-6, bibl. 2, illus.

In *Daphne odora* the flower buds are terminal on shoots of the current year; in Tokyo in 1950 differentiation took place at the beginning of July. In *Osmanthus aurantiacus* the flower buds are lateral on shoots of the current year; in Kagawa Prefecture in 1953 differentiation took place at the beginning of August.

1972. Esser, K., and Straub, J.
Das Pollenschlauchwachstum bei Forsythia, eine Stellungnahme zu der Moewusschen Hemmstoff-Ferment-Hypothese. **(The growth of the pollen tube in forsythia, a discussion of Moewus' growth inhibiting substance-enzyme hypothesis.)**
Biol. Zbl., 1954, **73**: 449-55, bibl. 12, illus.

The study of dimorphous flowers of *Forsythia intermedia* has led the authors to reject Moewus' hypothesis on the chemical basis of self-sterility [see *H.A.*, 20: 3096 and other papers by Moewus].—Univ. Cologne.

1973. Marchal, J.
Forsythia. Vervroegde bloei van struiken door koudebehandeling. Koude-behandeling van afgesneden takken. **(Forcing forsythia bushes by cold treatment. Cold treatment of cut branches.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 41-2.

Forsythia bushes were given cold treatment (−2 to −3° C.) for 4 weeks during November, then brought into the glasshouse where the temperature was raised to 75° and then to 80° F. 5 days later. A week later without further heating the whole crop had been harvested. Individual cut branches kept for 4 weeks at −2 to −3° C. flowered better than branches kept at ½ to 1° C.

1974. Tulecke, W. R.
Preservation and germination of the pollen of *Ginkgo* under sterile conditions.
Bull. Torrey bot. Cl., 1954, **81**: 509-12, bibl. 9, illus.

A method has been outlined for obtaining and preserving the pollen of *Ginkgo* under sterile conditions. The advantage of the technique has been emphasized as the lowering of the metabolic rate of the pollen while it is held within the sporangium, followed by subsequent dehiscence at a low temperature. Germination of both the fresh and the preserved pollen, the latter after storage for more than two years, has been successful on several media, one of which is outlined in detail. [Author's summary.]—Arizona St. Coll., Tempe.

1975. Crossley, J. H.
Propagating English holly from cuttings.
Mimeo. Domin. exp. Stat. Saanichton, B.C., **155**, 1954, pp. 8, illus.

Among the many ways of propagating holly, cuttings provide the easiest, quickest and most economical method. The results are given of several trials with 2 selections of *Ilex aquifolium*, on which the following recommendations are based: Cuttings 3 to 6 in. long are best taken in October and November from the tips of the current season's terminal growth. Standing the cuttings with their bases in a 50 p.p.m. solution of IBA for 24 hours immediately before planting is helpful. For rooting medium either sharp, clean sand or a 50: 50 mixture by volume of sand and sphagnum peat moss is satisfactory. Where a greenhouse is available bottom heat would not appear necessary, nor would air temperature fluctuations between 58° and 70° F. seem detrimental. With outdoor frames covered with glass or plastic bottom heat may prove beneficial, especially in exposed sites. Frames should also be shaded during sunny periods. The cuttings are usually ready to transplant in 90 to 120 days.

1976. Neal, O. M., and Pease, R. W.
A deciduous holly for winter color.
Nat. hort. Mag., 1954, **33**: 226-30, bibl. 5, illus.

This article on the winterberry, *Ilex verticillata*, includes an account of 3 trials on the rooting and hardening of softwood cuttings from both male and female trees. In general very satisfactory results were obtained with cuttings soaked in 60 to 70 p.p.m. IBA for 16 hours, set in washed sand, shaded with lath and watered through fog nozzles. Shading to provide half light gave much better results than did quarter light. With cuttings taken as early as 27 June all the male, but only half the female, cuttings rooted, whereas with cuttings taken on 18 July there was little difference between the sexes. This suggests that the carbohydrate reserves of the female plants, depleted by heavy cropping the previous autumn, had been replenished by the time the second batch of cuttings was taken.—W. Va agric. Exp. Stat.

1977. Muller, C. J.
Ivy varieties for glasshouse propagation.
Grower, 1955, **43**: 133-5.

Ivy is propagated by cuttings taken in August, just before the shoots have hardened. In the spring the cuttings may be potted up and grown in pots until sold, or they may be planted outside and potted up in the autumn. Varieties of *Hedera helix*, some hardy and some needing winter protection, are described.

1978. Krishnaswamy, N., and Raman, V. S.
A note on colchicine effect in *Jasminum sambac* Soland.
S. Indian Hort., 1954, **2**: 151-2, bibl. 3, illus.

Colchicine trials were conducted in 1949 on the common single-whorled form of *Jasminum sambac*. After severe pruning the young vegetative buds were treated with 0·5% colchicine in lanolin paste. Flower buds on shoots from treated buds were larger than those of the controls, but matured more slowly. The flowers were multi-whorled, with 2 stamens but little viable pollen. No change in the chromosome number was observed. It was concluded that the colchicine had a mutagenic effect, which has persisted in later branches from treated portions.—Agric. Coll. Res. Inst., Coimbatore.

1979. Teuscher, H.
Juniperus-Samen keimen im ersten Frühjahr nach dem Sammeln der Samen. (Juniper seeds germinate in the first spring after collection.)
Dtsch. Baumsch., 1955, **7**: 14-15, illus.

Fruits of *Juniperus virginiana glauca* were collected early in November and the seed was kept in plastic bags with sphagnum moss at 22–24° C. for 3 months and at +1° for a further 3 months. Sowing at the end of April resulted in 80% germination after 3 weeks, whereas untreated seed remained dormant.—Bot. Garden, Montreal.

1980. Wells, J. S.
New thoughts on juniper propagation.
Amer. Nurserym., 1954, **100** (9): 15, 83-90, illus.

Tests in Illinois with Pfitzer juniper showed that for successful rooting of cuttings taken from young wood the wood must be completely dormant and have been subjected to several hard frosts. If the cuttings are made with old wood at the base they may be taken earlier and will develop into better plants. The old wood can be most successfully rooted by taking it from December onwards, wounding it heavily and treating it with hormone powder. Once the cuttings have rooted they should be potted with the minimum of delay while the roots are still in active growth.

1981. Melander, L. W., and Eade, G. W.
***×Mahoberberis miethkeana*, a new hybrid.**
Nat. hort. Mag., 1954, **33**: 257-60, bibl. 3, illus.

A detailed taxonomic description is given of this *Mahonia×Berberis* hybrid which has proved rust resistant and is considered to be a welcome addition to the list of broad-leafed evergreens for landscape purposes.

1982. Hadfield, M.
Malus spectabilis.
Gdnrs' Chron., 1955, **138**: 35.

A note on the highly decorative "Chinese Apple Tree". There is evidence that it grows satisfactorily from seed.

1983. Wells, J. S.
Grafting pine and spruce.
Amer. Nurserym., 1955, **101** (1): 15-16, 54-9, illus.

Trials in Illinois have shown that for *Pinus sylvestris fastigiata Pinus sylvestris* is a better rootstock than *P. nigra* or *P. densiflora*. For both *P. s. fastigiata* and *Picea pungens kosteri* established rootstocks were preferable to newly potted ones. The best time for grafting was late February-early March. The best type of scion appeared to be a vigorously growing shoot of not less than pencil thickness, which may be 1- or 2-year-old wood. Side grafting with the flap remaining on the rootstock and covering one of the two shallow cuts made on the scion was found much better than veneer grafting. Waxing the union bound with twine was better than non-waxing and burying the point of union in moist peat.

1984. Kofranek, A. M.
Poinsettias for holiday trade.
Calif. Agric., 1954, **8** (12): 3, 10, illus.

The Henrietta Ecke poinsettia normally flowers in the Los Angeles area from 5 to 10 December and by the time the flowers are ready for sale for the Christmas market the central bracts are overripe and tend to drop out. Lengthening the day by providing supplementary light at night from 15 September to 4 or 6 October delayed flowering until 15 December. Plants grown under maximum light intensity of about 3,000 f.c. produced flowers with normal central bracts and relatively large, well-coloured outer bracts. Plants grown under low light intensity of 500 to 600 f.c. produced deformed central bracts which dropped readily.

1985. Pauley, S. S., and Perry, T. O.
Ecotypic variation of the photoperiodic response in *Populus*.
J. Arnold Arbor., 1954, **35**: 167-88, bibl. 22, illus.

The influence of the photoperiod on the time of termination of plant growth in *Populus* spp. was studied. Clones of wild populations of *P. trichocarpa*, *P. deltoides*, and *P. tacamahaca* were collected, propagated and grown under uniform conditions at Weston, Mass. Total height measurements were taken at 7, 5 or 3-day intervals. There was considerable variation in the time of terminal growth cessation, which was inversely correlated with latitudinal distribution. Clones originating in high latitudes stopped terminal growth early, while those from low latitudes stopped terminal growth late, under the day-length of mid-latitudinal conditions. The authors suggest that adaptation to length of growing seasons within a uniform day-length zone is effected by selection of those genotypes having a suitable photoperiodic response. Tests of photoperiodic sensitivity were carried out on lines of *Populus trichocarpa*, *P. tacamahaca*, *P. angustifolia*, *P. deltoides*, and some *P. tremuloides×P. tremula* hybrids, which were exposed to the natural day-length of Boston or to a long-day schedule equivalent to that at Juneau, Alaska. Height growth responses were variable but were most pronounced in clones from high latitudes under both normal and long day-lengths. Dormancy breaking was studied under natural day, continuous light and continuous dark conditions. In plants kept in darkness dormancy was successfully broken, but subsequent growth was etiolated. A study on the inheritance of photoperiodic response showed that progeny of a north-south cross stopped height growth at a time intermediate to that of their parents.

1986. Marchal, J., and Wezenberg, H. J.
Prunus triloba. Gebrekziekte veroorzaakt door kopergebrek. **(Deficiency disease of *Prunus triloba* caused by copper deficiency.)**
Jversl. Proefst. Bloem. Aalsmeer 1953, pp. 61-3.

A tip die-back in *Prunus triloba* was investigated. The symptoms were death of the apical bud, and marginal necrosis with early fall of the upper leaves. The application of Cu as a spray, injection or fertilizer corrected these symptoms. Some leaf injury was caused by a 0·5% $CuSO_4$ solution, but 0·25% was safe.

1987. ROYAL HORTICULTURAL SOCIETY.
The rhododendron and camellia year book 1955, No. 9.
R.H.S., London, 1954, 9×5½ in., pp. 102, illus., 10s.+9d. postage, or U.S. $1.65 post free.

Included in this year book are articles on hybrid camellias, the evolution and range of hardy hybrid deciduous azaleas, the preparation and planting of a virgin woodland with rhododendrons and various other papers and notes of interest. Among the notes mention may be made of one describing the propagation of *Camellia reticulata* by approach-grafting using *C. japonica* as rootstock and another which illustrates the rapidity with which rhododendrons may develop chlorosis when planted in a calcareous compost.

1988. COWAN, J. M.
A review of *Rhododendron giganteum* and its associated species.
Notes roy. bot. Gdn Edinb., 1955, **21**: 279-88, bibl. few in text, illus.

Seed from a rhododendron tree 80 ft. high was introduced to cultivation in Britain in 1919 and the first seedling flowered 17 years later. Since then other seedlings have flowered, but some of these were raised from later introductions of seed. It is now clear that more than one species is involved and that considerable confusion has arisen in nomenclature. The author describes the various forms available in some detail and suggests that 3 species should be recognized, namely, *R. giganteum*, *R. protistum* and *R. magnificum*, which may be distinguished on a basis of their leaf characters.

1989. COGGESHALL, R. G.
With rhododendrons. More about plastics in propagation.
Amer. Nurserym., 1954, **100** (10): 8-9, 56-7, illus.

Tests at the Arnold Arboretum showed that it was possible to propagate rhododendrons from stem cuttings, even in February, by the use of polyethylene plastic. A light frame of ½ in. strapping was erected over a section of the greenhouse bench, and this was enclosed on all sides with the polyethylene sheeting so that the case was sealed. Stem cuttings taken from short vegetative shoots, or short shoots of flowering wood with the flower bud removed, were heavily wounded, dipped in 1% indolebutyric acid in talc and planted inside the case. The medium consisted of sand, peat and Styrofoam in equal parts by volume. They were watered well after planting but no further watering was required for 4–6 weeks since the plastic is almost impermeable to water vapour. Excellent rooting was obtained from cuttings taken at any time from September to February. Most varieties were ready to pot within 3 months. After potting the cuttings were again covered with the polyethylene plastic until good root action was observed.

Noted.

1990.

a BRIFFOD, P.
Cultivez les cyclamens à peu de frais. **(Grow cyclamen at less cost.)**
Rev. hort. suisse, 1954, **27**: 379-81, illus.
Using one potting only.

b CAHOON, G. A., AND CRUMMETT, D. O.
Potassium affects growth of stocks.
Bett. Crops, 1954, **38**: 13-16, 50-1, bibl. 9.
For another account see *H.A.*, 25: 823.

c DEFRECHEUX, C.
L'utilisation du "plastic" pour réduire la transpiration des plantes. **(Plastic to reduce plant transpiration.)**
Bull. hort. Liège, 1954, **9**: 352-3, illus.
A short account of American work.

d DOULL, K. M.
Rose aphids. Modern methods of control.
N.Z. Gdnr, 1954, **11**: 297-8.
Control of 4 species by nicotine, lindane or better still HETP or TEPP.

e GERLACH, W.
Krankheiten und Schädlinge der Alpenveilchen. **(Diseases and pests of cyclamen.)**
Flugbl. biol. Bundesanst. Land- u. Forstwirtsch. **N1**, 1954, pp. 8, illus.

f HASEGAWA, M., AND SHIRATO, T.
Flavonoids of various Prunus species. II. The flavonoids in the wood of *Prunus speciosa*.
J. Amer. chem. Soc., 1954, **76**: 5559-60, bibl. 5.
Two identified as sakuranin and glucogenkwanin. For Part I see *H.A.*, 23: 2133j.

g MAARSE, D. E.
Fliedersorten für die Treiberei. **(Varieties of lilac for forcing.)**
Gartenwelt, 1954, **54**: 387-8, illus.

h MCMILLAN, R. G.
The effects of smoke pollution on plant life.
J. Pk Adm., 1955, **19**: 365-8.
Observations on plants in Manchester city parks.

i PEETERS, F.
Des nouveautés dans le domaine des azalées. **(New azalea varieties.)**
Rev. Agric. Brux., 1954, **7**: 1209-17, illus.
Descriptions of new Belgian varieties.

j PURI, B., AND SESHADRI, T. R.
Survey of anthoxanthins: Part VI—Isolation and constitution of neo-sakuranin.
J. sci. industr. Res. India, 1954, **13B**: 698-701, bibl. 12.
A new chalkone glucoside from bark of *Prunus puddum.*

k Puttarudriah, M., and Maheswariah, B. M.
A note on the biology and habits of *Ricania fenestrata* Fabricius, a new pest on jasmine.
Mysore agric. J., 1954, **30**: 12-15, bibl. 5, illus.
BHC gives control.

l Schubert, B. G.
***Begonia cucullata* and its varieties.**
Nat. hort. Mag., 1954, **33**: 244-9, bibl. extensive in text, illus.
More widely known as *B. semperflorens*; taxonomy and key.

m Sholto Douglas, J. W. E. H.
Soilless cultivation as an attraction in parks. Possibilities of the Bengal system of hydroponics.
J. Pk Adm., 1954, **19**: 268-71, illus.
Suggested adaptations described and illustrated.

n Smeby, R. R., and others.
The organic acids of *Narcissus poeticus*.
J. Amer. chem. Soc., 1954, **76**: 6127-30, bibl. 12.
In the bulbs.

o Taha, M. M.
The carotenoids of the petals of two species of *Tecoma*.
Biochem. J., 1954, **58**: 413.
Tecoma stans and *T. capensis*.

p Thielke, C.
Die histologische Struktur des Sprossvegetationskegels einiger Commelinaceen unter Berücksichtigung panaschierter Formen. **(The histological structure of the growing point of the shoot in some Commelinaceae, with special reference to variegated forms.)**
Planta, 1954, **44**: 18-74, bibl. numerous, illus.
Aneilema, *Commelina*, *Cyanotis*, *Rhoeo*, *Tradescantia* and *Zebrina* spp.

q Tryon, E. H.
Growing coniferous ornamentals from seed.
Nat. hort. Mag., 1954, **33**: 254-6, bibl. 1.
Seed storage, stratification and sowing.

r Tulecke, W. R.
Studies *in vitro* on the pollen of *Ginkgo biloba*.
Diss. Abstr., 1954, **14**: 589, being *Publ.* 7749 of 111 pp.

s Verdoorn, I. C.
The Transvaal Ericaceae.
J. S. Afr. Bot., 1954, **20**: 91-115, illus.
Descriptions and keys for *Erica*, *Philippia* and *Vaccinium* spp.

t Wood, H. B., Jr., and others.
Andromedotoxin: a potent, hypotensive agent from *Rhododendron maximum*.
J. Amer. chem. Soc., 1954, **76**: 5689-92, bibl. 10.
A toxin present in the leaves.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 2096k, o, s, t, w, 2293, 2314d, j.)

1991. Singh, M. P.
An improved marcot box for the aerial propagation on fruits.
Indian J. Hort., 1954, **11**: 89-93, bibl. 1, illus.

A marcot box of painted tin is described which forms a closed cylinder for the rooting medium. The boxes were fixed on several young citrus trees for 64 days. Ringed branches gave better rooting than tongue-sliced branches. Sour orange and sour lime formed fewer roots than other citrus varieties tried. Results with figs after 28 days showed that root formation was higher on ringed than on unringed branches; marcotting by this method gave better rooting than normal marcotting or cuttings. Among other fruits tested litchi and pomegranate rooted profusely while guava formed only a few roots. The jujube, carambola, sapodilla, aonla and custard apple developed considerable callus, but did not root within the period of the trial.

Avocadoes.

(*See also* 1369, 2096d, f, h, 2097g.)

1992. Malan, E. F., and van der Meulen, A.
Propagation of avocados.
Fmg S. Afr., 1954, **29**: 499-502, illus.

Aspects covered include rootstocks, planting seeds, shield budding, grafting, and planting out young trees. Budwood can be stored successfully for about a fortnight at 42° F. in damp moss or wrapped in air-pervious plastic such as polyvinyl chloride (P.V.C.) or polythene. In fact, stored budwood may give better takes than fresh, because many buds with a tendency to absciss drop off during storage instead of after insertion. The use of P.V.C. plastic grafting strips has facilitated both budding and grafting. Attempts to top-work trees in South Africa have so far given poor results.

1993. Malan, E. F., and van der Meulen, A.
Establishing an avocado orchard.
Fmg S. Afr., 1954, **29**: 481-6, 492, illus.

South African and American experience is reviewed with reference to planting distances, transplanting, protection against sunburn, cultivation, manuring with major and minor elements, leaf composition, irrigation, mulching and cover-cropping, pruning, thinning and temperatures in relation to biennial bearing, harvesting and yields, maturity tests, packing and export and the uses and composition of the fruit. [Although authors of papers and their dates are cited, full bibliographical references have unfortunately been omitted.]

1994. Haas, A. R. C., and Brusca, J. N.
A leafy malady of avocado trees.
Citrus Leaves, 1955, **35** (1): 18, 20, illus.

Two forms of leaf spotting, of which the cause is uncertain, are described. In the first very numerous, light-coloured, translucent spots developed on the leaves of Topa Topa avocadoes grown in a molybdenum deficient soil with a complete nutrient solution minus Mo. The role of Mo, if any, remains to be determined. In the second leaf spots, translucent on the upper surface and raised on the lower, occurred on trees of Fuerte-Carr-Hybrid grown on various rootstocks in sand and soil cultures under glass but not in corresponding cultures out-of-doors. It is thought possible that the relatively high humidity in the glasshouse combined with reduced light may be a factor in the initiation of this malady.

1995. Loest, F. C., and Stofberg, F. J.
Avocado diseases.
Fmg S. Afr., 1954, **29**: 517-20, illus.

Descriptions and control are given of root and trunk rot (*Phytophthora cinnamomi*), scab (*Sphaceloma perseae*), corky blemishes on the fruit due to friction and known as carapace, sunblotch virus, and leaf spots caused by algae and lichens. Insect pests included are false codling moth, scale insects, thrips and aphids.

1996. Bingham, F. T., and Zentmyer, G. A.
Relation of hydrogen-ion concentration of nutrient solution to *Phytophthora* root rot of avocado seedlings.
Phytopathology, 1954, **44**: 611-14, bibl. 19, illus.

Avocado seedlings were grown for several weeks in solution cultures containing nitrogen as either nitrate or ammonium and adjusted to hydrogen-ion concentrations ranging from pH 3·0 to 8·0. *Phytophthora cinnamomi* Rands was introduced into the cultures, and the resulting root-rot development was observed. Root rot occurred in all inoculated cultures from those of pH 3·5 to those of pH 8·0. There was no disease development at pH 3·0. As the reaction of the solution cultures was lowered from pH 6·0 to 3·5, the rate at which the roots of the host became diseased decreased markedly. Disease development was also somewhat slower at pH 8·0 than at pH 6·0. The type of nitrogen supplied to the host had no effect on the rate at which root rot developed at a given pH level. [Authors' summary.]—Univ. Calif., Riverside.

1997. Zentmyer, G. A.
Chemotherapy for control of *Phytophthora* root rot of avocado.
From abstr. in *Phytopathology*, 1954, **44**: 511-12.

Spraying with 8-hydroxyquinoline benzoate markedly retarded progress of wilting and increased new root development over that of controls; retardation of invasion of roots was slight. Neutralization of a fungus toxin within the plant is indicated.

Citrus—general.

(*See also* 1280, 1281, 2096n, p, u, x, 2097a, b, f, 2195, 2309.)

1998. Chapot, H.
Les agrumes au Liban. (**Citrus in Lebanon.**)
Publ. Stat. agron. libano-franç., 1954, pp. 39, illus.

Points covered in this survey include: Climate; current production; geographical situation and establishment of plantations; windbreaks of cypress, *Casuarina* and living or cut reeds; spacing; varieties of orange, lemon and mandarin; cultural practices, including irrigation and manuring; training and pruning; control of pests, chiefly *Phyllocoptes oleivorus*, *Paratetranychus citri*, *Chrysomphalus aonidum* and *Ceratitis capitata*; fungus and virus diseases, chiefly gummosis (*Phytophthora parasitica*), psorosis, mal secco (*Deuterophoma tracheiphila*), *Fusarium solani* causing gumming of buds and leaves and collar rots, and pruning wound rots; deficiency diseases associated with zinc, boron and copper and honeycombing of the fruit surface; harvesting and marketing, including grading, yields, economics and export control; and prospects. Fruits of 8 varieties are illustrated in colour. An appendix contains brief notes on sweet sop, cherimoya, avocado, mango, date palm and pomegranate.

1999. Van Horn, C. W.
Lemon development costs on the Yuma Mesa.
Calif. Citrogr., 1954, **40**: 63-4.

Itemized estimated costs of developing an irrigated lemon orchard on the Yuma Mesa, Arizona, are tabulated for each of the first 5 years. Allowing $600 per acre for land and $250 for 100 trees the total cost over 5 years works out at $1,454 against which can be set about $300 for the sale of fruit.

2000. Prosser, D. S., Jr.
Hedging machine for citrus groves.
Bull. Fla agric. Exp. Stats **519**, 1953, pp. 12, illus.

A mechanical hedging machine has been developed for use in citrus groves in Florida. Construction specifications and operational data have been presented. Use of this machine affords an economical method of hedging citrus groves with the attendant advantages of increased production, ease of movement through grove, decrease in dead wood, and increased effectiveness of spray and dust programs. [Author's summary.]

2001. Prosser, D. S., Jr.
Grove hedging studies on citrus.
Citrus Mag., 1955, **17** (6): 18-19.

Machine hedging of citrus is much more economical than hedging by hand or by pneumatic pruners. The trees recover most rapidly when hedging is done immediately before the spring flush. The operation increased fruit size and quality in tangerines. The author recommends hedging north and south, cutting alternate sides of the trees each year.

Citrus—varieties and propagation.

(*See also* 1225, 1287, 2096a, r.)

2002. Cassin, J., and Haendler, L.
Note sur les caractères commerciaux de quelques variétés d'agrumes cultivées en Guinée. (**The commercial characters of some varieties of citrus grown in [French] Guinea.**)
Fruits d'Outre Mer, 1954, **9**: 452-61.

The commercial characters of 25 varieties of grapefruit, orange and lemon grown in French Guinea are compared with those of North African citrus. Oranges have the disadvantage of absence of orange colour at maturity, inadequate acidity, thick and leathery partitions, absence of red colour in the blood varieties Ruby and Sanguine de Portugal and poor quality in

Ruby, Acme and Thomson Navel; Valencia Late is the most promising. Mandarins yield poorly and do not colour properly. The quality of grapefruit and lemons, however, is equal to that found in North Africa, and among grapefruit Foster, Thompson and Pink Marsh have pinker flesh and mature earlier than in North Africa. Among lemons Eureka is very satisfactory and the local selection Bambam shows promise.

2003. Benemerito, A. N.
Some promising citrus fruits introduced from China into the Philippines.
Philipp. J. Agric., 1953 (issued 1954), **18**: 1-29, illus.

The fruits in question are Chinese and European lemons, sweet oranges, mandarins and pummelos (*C. grandis*). A short glossary is given of the names of the different species in Cantonese and Mandarin.

2004. van der Meulen, A., Malan, E. F., and Naudé, C. J.
Citrus propagation.
Fmg S. Afr., 1954, **29**: 487-92, bibl. 4, illus.

This article includes recommendations on types of rootstock, seedbed management, establishment of rootstocks in the nursery, time of budding, selection and handling of budwood, budding techniques, care of budlings, and the lifting, fumigation and packing of trees.

2005. Singh, L. B., and Singh, R. N.
Studies in polyembryony in common citrus rootstocks.
Sci. and Cult., 1955, **20**: 347-8, bibl. 2.

The average number of embryos per seed, the percentages of polyembryonic seeds, of seeds producing more than one seedling and of nucellar seedlings are given for 11 citrus rootstocks, namely sylhet lime, jamberi, khatta, Italian lime (all *C. aurantifolia*), Florida rough lemon, galgal, sweet lime (all *C. limon*), Satsuma Mikan (*C. paradisi* or hybrid), trifoliate orange, Seville orange, pummelo.—Saharanpur hort. Res. Stat.

2006. Sleeth, B.
Pruning wound paint for budded citrus nursery stock wounds.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 100-2.

Four asphalt wound paints containing 1% pentachlorophenol in which kerosene, carbolineum or naphtha were used as the solvent, gave satisfactory results on citrus nursery stock. The paints affected the healing response less than did different rootstocks. Callus initiation and healing over of the stock wounds was slower with Cleopatra mandarin than with sour orange.

2007. Monselise, S. P., and Brisker, H.
Preparing Jaffa orange trees for planting. [Hebrew.]
Hassadeh, 1954, **34**: 795-6, bibl. 2.

Artificial defoliation of "Shamouti" orange trees was favourable to their survival at planting time. The spraying of sugar solutions did not improve the "take" or subsequent growth of the trees whether defoliated or not. H.C.R.

Citrus—tree composition and nutrition.

(*See also* 2096j, q, 2097c, e.)

2008. Smith, P. F., and others.
Effect of differential nitrogen, potassium, and magnesium supply to young Valencia orange trees in sand culture on mineral composition especially of leaves and fibrous roots.
Plant Physiol., 1954, **29**: 349-55, bibl. 19.

Chemical analyses were made of leaves, trunks and branches, large roots and fibrous roots of budded Valencia orange trees grown in sand culture at different levels of N, K and Mg. Leaf sample analyses showed that the trees did not reach a balance equally quickly with all nutrients. N, P and K values in leaves and fibrous roots were fairly similar, but slightly lower in the roots. Numerous interactions were found between N and either K or Mg on the concentrations of various elements in both roots and leaves: K and Mg showed few interactions. Base reciprocations were evident in all parts of the tree. Their nature and extent varied from one part of a tree to another, and they were influenced by differences in the supply rates of all 3 variable elements. [For effects on growth and fruit see *H.A.*, 24: 769.]—U.S. hort. Field Stat., Orlando, Fla.

2009. El-Tomi, A. M. L.
A study of some responses of Florida citrus trees to nitrogen nutrition and irrigation.
Diss. Abstr., 1954, **14**: 1874, being *Publ.* 9707 of 159 pp.

Satsuma orange leaves were more numerous per shoot and individually heavier than Hamlin leaves. They also contained more N and chlorophyll than Hamlins. In Hamlin the number of leaves per shoot was related to N applications. Analysis of responses to 3 levels of soil N showed that when any significant differences in leaf characters were observed, high N plots always gave higher values than low N plots. Leaves of the spring flush were analysed during 1 year's growth. In both varieties the values for dry weight and N in an average leaf and of dry weight as a percentage of fresh weight of the leaf were lowest in March, and increased to a maximum by the following February. The values of fresh and dry weights of leaves on a single twig, and of the N in such a leaf sample followed a similar seasonal trend in Satsuma, but not in Hamlin. The leaf N of Satsuma, as a percentage of dry weight of leaf, was highest in March and lowest in February. The chlorophyll content of Satsuma leaves was lowest in March, increased to a maximum in the autumn and decreased again by February. In Hamlin the chlorophyll also had a mid-season maximum, reached somewhat earlier than that of Satsuma. Irrigation of plots to near field capacity did not generally give values significantly different from unirrigated plots. Exceptions were observed in Satsuma leaves as regards fresh weight per unit area in high N plots and chlorophyll content in low and medium N plots.—Univ. Fla.

2010. Cooper, W. C., and Peynado, A.
Boron accumulation in citrus as influenced by rootstock.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 86-94, bibl. 10.

Boron analyses were made on leaves of orange and grapefruit trees growing on various rootstocks and irrigated with waters containing from 0·2 to 6·0 p.p.m. of B. B concentrations in grapefruit leaves ranging from 61 to 880 p.p.m. were influenced by rootstock. Trees on sweet lime and sweet lemon accumulated large amounts of B, trees on Cleopatra mandarin, sour orange, sweet orange, and rough lemon accumulated lesser amounts, while those on *Severinia buxifolia* accumulated the least. The B contents for orange and grapefruit scions on the same rootstock were remarkably similar. [From authors' summary.]

2011. Wallace, A.
Calcium and magnesium in citrus seeds.
Plant Physiol., 1954, **29**: 488, bibl. 8.

The content of Ca in citrus seeds is equal to, or greater than, that of Mg. There was some indication of a relationship between the concentrations of Ca and Mg in the foliage of the plants and in their seeds.—Univ. Calif., Los Angeles.

2012. Kilpatrick, D. T., and Lohmeyer, V. K.
Copper deficiency of citrus in South Australia.
J. Dep. Agric. S. Aust., 1954, **58**: 129-30, illus.

Copper deficiency symptoms were shown by 6-year-old Improved Valencia trees growing under sprinkler irrigation. The soil had been intensively cropped to vegetables, particularly carrots, before planting to citrus. In the spring, a bordeaux spray of 3: 3: 50 was applied with a soil application of 4 oz. $CuSO_4$ to each tree. The trees responded rapidly, but Zn deficiency developed and was corrected by a foliar spray. The trees showed complete recovery 1 year after treatment started.

2013. Leonard, C. D., and Stewart, I.
Iron chlorosis.
A.R. Fla agric. Exp. Stats 1952/53, p. 178-80.

Iron chlorosis can be corrected economically by the application of the iron chelate of ethylenediamine tetraacetic acid (Fe-EDTA) on acid soils and of iron complexed with N-hydroxyethyl ethylenediamine triacetic acid (EDTA-OH) on calcareous soils [see also *H.A.*, 24: 4201]. Experiments concerning the compatibility of Fe-EDTA with mixed fertilizers show that high phosphate concentrations reduce its effectiveness. Since Fe-EDTA dust causes burning of fruit a dustless material for mixture with fertilizers was made by spraying Fe-EDTA on to vermiculite and letting it dry. When used in this form no damage to leaves or fruit of citrus trees has been observed from applications of as much as 1,000 g. chelated Fe per tree.

2014. Cooper, W. C., and Peynado, A.
Experimental control of iron chlorosis of citrus in some Rio Grande Valley soils with chelated iron and with gypsum.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 79-85, bibl. 5, illus.

Iron chlorosis of grapefruit, occurring in a calcareous soil and in a soil containing residual sodium carbonate from irrigation water, was corrected by soil applications of EDTA-OH. Gypsum had no apparent corrective effect on iron chlorosis of grapefruit in calcareous soils, but was highly effective in the non-calcareous soil containing residual sodium carbonate. EDTA and EDTA-OH, but not DTPA, caused injury to grapefruit leaves.

2015. Lundberg, E. C.
Sodium in citrus nutrition.
A.R. Fla agric. Exp. Stats 1952/53, pp. 220-1.

All combinations of nil, low and high Na and K were given in pot experiments begun late in 1951 to study the interrelationships involved in the uptake of these 2 elements in Valencia orange and Thompson grapefruit in sand culture. K deficiency symptoms appeared in mid-1952 and were much more severe in Thompson than in Valencia. Their incidence, characters and severity in relation to K and Na dosages are described.

2016. Haas, A. R. C., and Brusca, J. N.
Leaf symptoms of biuret toxicity.
Calif. Agric., 1954, **8** (11): 8-9, 14, illus.

The various degrees of marginal chlorosis produced in several species of citrus and avocado grown in soil cultures by a single application of biuret supplied in concentrations ranging from 50 to 250 p.p.m. are described. The most sensitive species showed some chlorotic spots with 50 p.p.m. and the amount of chlorosis increased progressively as the concentration was increased. The most resistant species showed little or no injury with concentrations below 200 p.p.m. Experiments with lemons indicated that the maximum benefit from urea sprays might be expected when these are applied in cool or dull weather and also that, when urea applications are excessive and temperatures high, leaf patterns suggestive of biuret injury may be produced. [See also *H.A.*, 24: 4167.]

2017. Stewart, I., and Leonard, C. D.
Nature and cause of yellow tipping.
A.R. Fla agric. Exp. Stats 1952/53, pp. 177-8, illus.

Studies in 1952/53 have disclosed that a yellow tipping of citrus leaves common in Florida is caused by perchlorates occurring as impurities in natural potassium nitrate from Chilean sources. This toxicity shows up first as a bright yellow-orange colour at the tip of the leaf. As the condition becomes worse the orange colour may spread over the entire upper half of the leaf. In severe cases partial defoliation occurs.

Citrus—climatic factors.

2018. Caprio, J. M., Harding, R. B., and Jennings, R. F.
Effect of temperature on orange size and yield.
Calif. Citrogr., 1954, **40**: 47, 76-80, bibl. 14.

A statistical study was made of the effect of temperature on the size and yield of Valencia and Navel oranges in the Redlands area of southern California. Fruit size and yield data for a 31-year period, starting when the trees were 14 to 17 years old, were expressed as a continuous function of mean monthly temperature departures for a period of 20 months. For both varieties there was an indication of a decrease in fruit size with increasing age of tree. For both varieties yield tended to rise towards a peak followed by a downward trend; for Valencias the peak occurred at 30 years of age and for Navels at 35. The data showed statistically significant relationships between fruit size and temperature but not between yield and temperature. Warmer than average autumn and winter temperatures increased fruit size in both varieties, but whereas warmer than average spring and summer temperatures also appeared to favour larger size in Navel fruits the reverse was true of Valencia fruit. Possible reasons for this difference are discussed.

2019. Cooper, W. C., Tayloe, S., and Maxwell, N.
Preliminary studies on cold hardiness in citrus as related to cambial activity and bud growth.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 1-15, bibl. 24, illus.

The problem was studied in 3-year-old Webb Red Blush grapefruit and Meyer lemons on sour orange stocks. In trees not irrigated during the winter period a low level of cambial activity was induced in the tops during late January and early February. In irrigated trees the minimum injurious temperature rose from 23° F. in early January to 26–27° F. in early February. In non-irrigated trees the minimum temperature causing injury in early February was 20·5° F. for lemons and 23° F. for grapefruit. When the dry lemon trees were irrigated this temperature rose to 27° F. The quality of irrigation water, growth inhibitors and short-day treatments had no apparent effect on cambial or bud growth. A study of Webb Red Blush grapefruit on 33 different rootstocks showed that the rootstock had only a small effect on cambial activity; clearer effects were observed, however, with time of bud growth. In both cases the effects were of short duration.

2020. Ziegler, L. W., and Cordy, C. B.
Radiation injury to citrus on frosty nights.
Citrus Mag., 1955, **17** (6): 12-13, illus.

Frost injury to citrus fruits was observed after a radiation frost. On Eustis limequat the injury began as a watersoaked area, followed by a gradual bleaching of the rind on either side of the exposed cheek of the fruit. On calamondins the effects were similar but slower to appear and not so extensive. Kumquats showed little rind damage.

2021. Nekrasova, T. V.
On the light adaptation of citrus plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **98**: 281-4, bibl. 9.

Earlier work had shown that while citrus plants require long daily illumination and high light intensity for satisfactory growth, they can adapt themselves to unfavourable light conditions [see *H.A.*, 24: 780]. In further experiments it was found that low light intensity increases the chlorophyll content, its resistance to decomposition and the peroxidase activity of leaves and reduces their ascorbic acid content and reducing capacity. The reduction of day-length increases the content of sugars in the leaves and, apparently, retards their movement into the shoots, thus inhibiting growth.

Citrus—flowering and pollination.

2022. Sauer, M. R.
Flowering in the sweet orange.
Aust. J. agric. Res., 1954, **5**: 649-57, bibl. 4.

Anthesis in Navels and Valencias in the Mildura district normally takes place over a period of 5–6 weeks from late September to the end of October. The first flowers to open are terminal (distal) on leafless shoots. Flowers on leafy shoots are generally open about 1 week later. Terminal flowers open early, except solitary flowers on leafy shoots. The lowest (proximal) buds are next to attain anthesis, and subterminal flowers are last. Late-opening flowers have a better chance of producing fruit than those which open early, and in consequence most fruit are developed from subterminal flowers, or from those buds just below the subterminal. Most fruiting flowers open not earlier than the fourth week of the flowering season. Flowers which are slow to reach anthesis, but do not produce fruit, remain on the tree longer than flowers which develop early. Drop of flowers after blossoming is a continuous process; there does not appear to be any particular time or period of development which is critical. Flowers on the shaded side of the tree open about 1 week later than those exposed to the sunshine, but this does not result in a better set of fruit on the shaded side. [Author's summary.]—Commonw. Res. Stat., Merbein.

2023. Aala, F. T.
Effects of hand pollination on the production of Siamese pummelo.
Philipp. J. Agric., 1953 (issued 1954), **18**: 101-13, bibl. 13.

The Siamese 3442 pummelo, a variety widely grown in the Philippines, produces ample flowers but low yields. Tests were made at the Lipa Citrus Experiment Station in 1946/48 to determine whether this is due to inadequate pollination. The results and conclusions were: (1) Artificial self-pollination gave a higher percentage of fruit setting than open-pollination. (2) Cross-pollination with pollen from other cross-compatible varieties gave a higher percentage fruit set than either artificial, self- or open-pollination. (3) A higher percentage fruit set was obtained during the off-season than during the regular flowering period. (4) The low percentage of fruit set in Siamese 3442 may be due to self-sterility and to an inadequate number of insect pollinators during the regular flowering season.

Citrus—spraying for cultural purposes.

2024. Deszyck, E. J.
Physiological studies. Effect of lead arsenate in relation to borax sprays on Marsh grapefruit.
A.R. Fla agric. Exp. Stats 1952/53, pp. 182-3.

Lead arsenate sprays, used extensively on Florida grapefruit to reduce citric acid and advance maturity, often produce fruit gumming similar to that caused by boron deficiency, even though adequate B is present. Where lead arsenate is used in conjunction with borax, gumming may still occur but to a lesser degree. The effect on quality and production of B applied alone or with lead arsenate was studied in Marsh grapefruit on rough lemon for 3 years. *Internal quality.* Percentage soluble solids was slightly increased by both B and arsenic. Acid content was decreased by arsenic and slightly increased by B. The solids/acid ratio was increased by arsenic and decreased by B. B had no significant effect on juice volume, juice percentage and vitamin C while arsenic reduced the first 2 and increased the third. *External fruit quality.* B had no significant effect on size but arsenic reduced it. Gumming was halved by B and slightly increased by arsenic except at the recommended 1¼-lb. rate. *Production.* Yield was not affected by B but was slightly reduced by arsenic. [See also *H.A.*, 24: 4215.]

2025. HALSE, N. J.
The effectiveness of 2,4-D in preventing pre-harvest drop of Navel oranges.
J. Agric. W. Aust., 1954, **3**: 670-2, bibl. 3.

An experiment was carried out to test the suitability of combining a 2,4-D hormone spray with a routine fungicidal spray of bordeaux mixture. The hormone was tested at 2 concentrations. Results indicated that under the conditions of the trial the 2,4-D spray could not be successfully combined with bordeaux, and that a concentration of 20 p.p.m. of the hormone was superior to 10 p.p.m. [From author's abstract.]

Citrus—diseases and pests.

(*See also* 1187, 2097h.)

2026. GALLE, C.
Concentric ring blotch.
Citrus Gr, 1955, No. 252, pp. 1-3, illus.

Concentric ring blotch, a disease of unknown cause, was first described in South Africa in 1924. The symptoms were at first confined to the leaves, especially of young trees, but are increasingly affecting the fruit, the skin showing irregular blotches, though eating and keeping quality remain unaffected. Varietal susceptibility and the present distribution, symptoms and characters of the disease are discussed.

2027. MOORE, P. W., NAUER, E., AND YENDOL, W.
Psorosis—citrus enemy No. 1.
Calif. Citrogr., 1955, **40**: 82-3, 92-3, bibl. 5.

A recent survey of 220 orange orchards in Southern and Central California suggests that approximately 8% of the mature trees in California show bark lesion symptoms of psorosis. Four progressive stages of psorosis are described and the amount of crop reduction caused by each stage is given as a percentage of normal yield. A method of using the percentage yield factor to calculate the estimated long-time loss of production efficiency is described. A twice a year orchard survey and early treatment of new cases of psorosis are recommended as a means of discovering new outbreaks and prolonging the productive life of infected trees. Growers are encouraged to purchase nursery trees known to be grown from registered psorosis-free buds as a long-term insurance against future losses from the disease. [Authors' summary.]

2028. COHEN, M., AND KNORR, L. C.
Honeycombing—a macroscopic symptom of tristeza in Florida.
From abstr. in *Phytopathology*, 1954, **44**: 484.

More than 90% of the citrus trees found injured to date by tristeza in Florida have shown a pattern of minute holes called "honeycombing" on the inner surface of the bark of the sour orange rootstock just below the bud union. Other conditions simulating honeycombing may be distinguished from typical tristeza honeycombing by the absence of other histological features of tristeza and by failure to transmit vein clearing symptoms of tristeza to Key [West Indian] lime seedlings when budded from affected trees.

2029. WALLACE, J. M., AND DRAKE, R. J.
The tristeza virus in Meyer lemon.
Citrus Leaves, 1955, **35** (1): 8-9, 23, bibl. 10, and *Calif. Citrogr.*, 1955, **40**: 84, 95-6, bibl. 10.

Tristeza virus has been found in 38 out of 40 Meyer lemon trees tested in different parts of California. As some of these trees are only one bud-generation removed from the original introduction of the variety from China in 1908 it is highly probable that the introduction carried the virus. The "incompatibility" between the Meyer lemon and sour orange rootstocks may be explained on this basis. The discovery of 2 virus-free Meyer lemons in California and of a "sour-orange tolerant" strain of Meyer, named the Ricketts lemon, in Texas suggest that virus-free buds may sometimes be obtained from infected trees. [See also *H.A.*, 24: 3052.]

2030. OLSON, E. O., AND SHULL, A.
Red grapefruit strains as symptomless carriers of the causal agent of cachexia, a bud-transmitted disease.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 46-50, bibl. 7.

When psorosis-free red grapefruit buds were grafted on Orlando tangelo trees, symptoms of cachexia developed within 28 months in some of the tangelo test plants. Individual trees of 7 different commercial strains of red grapefruit yielded at least 1 positive test for cachexia. No symptoms occurred in test plants grafted with grapefruit buds from Red Blush seedlings nor did they appear on unbudded Orlando tangelo scions. [From authors' summary.]

2031. KLOTZ, L. J., DEWOLFE, T. A., AND DESJARDINS, P. R.
Bacterial blast and black pit of citrus.
Citrus Leaves, 1955, **35** (1): 10-11, illus., and *Calif. Citrogr.*, 1955, **40**: 108-9.

In the northernmost citrus plantings in California *Pseudomonas syringae* does considerable damage to orange and grapefruit twigs and foliage and to lemon fruit. Orchards exposed to wind-driven rain and hail are most subject to attack. Bordeaux mixture, 10-10-100, applied early in November has proved the most effective spray but is not entirely satisfactory. In cultures streptomycin sulphate has shown toxicity to the bacterium and this and other antibiotics are to be tested in the field.

2032. MORWOOD, R. B.
Citrus canker.
Agric. J. Dep. Agric. Fiji, 1954, **25**: 15-16.

Citrus canker (*Xanthomonas citri*) was first found in Fiji in 1950. Steps to eradicate it have made good progress. They consist mainly of digging out and burning infected trees and their near neighbours.

2033. CALAVAN, E. C., AND WALLACE, J. M.
***Hendersonula toruloidea* Nattrass on citrus in California.**
Phytopathology, 1954, **44**: 635-9, bibl. 20, illus.

It has been confirmed that *Hendersonula toruloidea* is a wound-invading pathogen capable of causing die-back and cankers on grapefruit in southern California. A form of gummosis sometimes occurs which closely resembles Rio Grande gummosis but the internal symptoms of the two diseases are different. Control measures should only be needed under certain adverse environmental conditions and might then best be based on maintaining tree vigour, using adequate frost protection, cutting out and burning diseased wood, treating pruning wounds and whitewashing exposed stems and branches of severely pruned trees.

2034. Hepburn, G. A., and Bishop, H. J.
The insect pests of citrus in South Africa.
Bull. Dep. Agric. S. Afr. **333**, 1954, pp. 31, bibl. 18, illus.

The life history and control of the major citrus pests in South Africa are described. The pests are: red, mussel and soft brown scales, citrus mealybug, ants, Mediterranean fruit-fly, Natal fruit-fly (*Pterandrus rosa*), false codling moth (*Argyroploce leucotreta*), citrus thrips, aphids, orange-tree butterflies (*Papilio* spp.), American boll-worm (*Heliothis armigera*), and citrus psylla (*Spanioza erytreae*).

2035. Stofberg, F. J.
Ant control in citrus orchards.
Fmg S. Afr., 1954, **29**: 529-31.

The control of *Pheidole megacephala* in relation to soft scale on citrus was studied on young Valencia and Navel trees. In preliminary trials dieldrin and chlordane gave promising results, the former being more persistent, especially at higher concentrations. A comparative trial with several insecticides showed that: 2% DDT was more effective than 1% DDT, and at the higher concentration the emulsion was effective for longer than the wettable powder; 1½% chlordane as an emulsion or wettable powder gave control equal to that of 1% DDT; 1½% endrin or dieldrin emulsions gave excellent control and kept the trees ant-free for 12 and 14 months respectively.—Nelspruit Res. Stat.

2036. Thompson, W. L., Johnson, R. B., and Sites, J. W.
The status of purple mite and its control.
Citrus Mag., 1955, **17** (5): 8-11, 20, bibl. 7.

Purple mite (*Metatetranychus citri*) infestations were heavier in citrus plots that had received sulphur sprays than in untreated plots. Parathion had little effect on subsequent infestations. A combination of oil emulsion (0·65% oil) with 1 lb. 15% parathion gave good control of scale insects and purple mites, but 1·3% oil was more effective for mite control. Purple mites were found to be resistant to ovotran after 2–3 applications at 30-day intervals. No resistance of mites was found to DN compounds or to aramite. Longer periods of control were obtained where miticides were applied to light infestations than to heavily infested trees. Leaves infested with purple mites in April and May were affected with mesophyll collapse to a greater degree than leaves that were free of mites. [From authors' summary.]

2037. Jeppson, L. R., and Ortega, J. C.
Use of demeton on citrus trees.
Calif. Agric., 1954, **8** (11): 13.
Systox shows promise as control for mites and aphis attacking California citrus.
Citrus Leaves, 1954, **34** (11): 6-7.

Demeton, applied as Systox containing 21·2% active material per gal., has shown outstanding promise for the control of citrus red mite and green citrus aphid when applied as sprays containing not less than 4 oz. of the liquid concentrate per 100 gal. Soil applications have been less effective and trunk applications have caused some bark injury. [See also *H.A.*, 25: 945.]

2038. Johnston, C. J. R.
Mildura trials. Entomologist's report on 1953 scale control with white oil, HCN fumigation and parathion.
Citrus News, 1954, **29**: 158.

White oils and parathion were compared at Irymple, Victoria, in 1953 and 1954 for the control of red scale, *Aonidiella aurantii*, on Valencia oranges. Standard white oil gave the best results in both years. In 1953 a 1 in 40 application in February gave 72 and 47% mortality on leaves and fruit respectively compared with 57 and 28% with the best parathion formulation. In 1954 mortality on the leaves after a February spray ranged up to 91·3% with white oil compared with 82·9% with parathion but after a second spray in April the figures were 99% for both materials. In a similar comparison of white oils, parathion and HCN fumigation at Redcliffe in 1952 parathion gave the cleanest fruit. In 1953, a year of heavy infestation, white oil in February followed by parathion in April gave the best results.

2039. DuCharme, E. P.
Cause and nature of spreading decline of citrus.
Citrus Ind., 1954, **35** (11): 6-7, 18, and **35** (12): 5-7, bibl. 15; and *Citrus Mag.*, 1954, **17** (4): 11-14, 24-9, bibl. 15.

The author reviews the research carried out on spreading decline of citrus in Florida and discusses the evidence for concluding that it is due to the burrowing nematode, *Radopholus similis*. The basis for this rests mainly on the following experimental results: 1. The burrowing nematode was found to be the only parasitic nematode consistently associated with lesions in the feeder roots of affected trees; 2. The nematode occurred in citrus groves only in close proximity to affected trees; 3. Spreading decline symptoms were experimentally reproduced with naturally infested soil and hand-picked specimens of the nematode.

2040. Suit, R. F.
The experimental basis and limitations of the pull-and-treat method of handling spreading decline.
Citrus Ind., 1955, **36** (1): 12, 14-16, bibl. 4, and *Citrus Mag.*, 1955, **17** (7): 10-13, 20, bibl. 4.

In experiments started in 1948 with 2 infected plots of citrus in a decline area, the trees were pulled and the soil treated with 40 gal. of DD per acre before replanting. Six years later trees in the centre of the plot were still free from nematode and were larger than the rest, but the outer rows had been contaminated. In another treated plot a barrier of 4 rows of apparently healthy trees was removed, and this checked reinfestation. In 1953 the recommended dosage of DD required was raised to 60 gal. per acre injected to a depth of 12 in., its probable penetration on sandy soil being 8 to 10 ft.

Nematode sampling before treatment should give an accurate map of the area to be treated, and replanting should not be done for 2 to 3 months. This method is, however, limited by the perpetual hazard of reinfestation and its cost. Experiments on the use of a barrier to prevent reinfestation of treated plots show promise. A tree row well in advance of the affected area is pulled, and DD injected at 100 gal. per acre each year. [See also *H.A.*, 24: 4226.]

2041. Howell, M.
Practical aspects and cost of the "pull and treat" method.
Citrus Ind., 1955, **36** (2): 11, and *Citrus Mag.*, 1955, **17** (7): 21.

The practical method of uprooting and burning trees infected with spreading decline is described. The total cost of all operations, including replanting, is approximately $450 per acre.

2042. Suit, R. F.
Resistant rootstock studies using the temperature tank for screening.
Citrus Ind., 1955, **36** (2): 11-12, 14-15, bibl. 2, and *Citrus Mag.*, 1955, **17** (8): 13-14, bibl. 2.

Studies are in progress at the Florida Citrus Experiment Station on the immunity of citrus rootstocks to the burrowing nematode, *Radopholus similis.* Rootstocks are grown in a temperature tank where the soil temperature is maintained at 75–78° F., which is very favourable to the nematodes and enables rapid screening. After 3 months, seedlings grown in infested soil had grown to only about half the height of those in healthy soil.

2043. Suit, R. F.
Research on non-phytotoxic chemical treatments for soil treatment.
Citrus Ind., 1955, **36** (2): 13-14.

Many chemicals have been tested in the search for a nematocide for *Radopholus similis* which is also non-phytotoxic. Two materials OS-1897 and V-C 1-13 used as soil injections show some promise for possible non-phytotoxic treatment of citrus trees. Mulching treatments did not control the nematode.

Citrus—fruit composition and maturity.

(*See also* 1208, 2024, 2055, 2096 l.)

2044. Wedding, R. T., and Horspool, R. P.
Juice composition changes during orange development.
Calif. Citrogr., 1955, **40**: 106-7.
Compositional changes in juice of Valencia and Washington Navel oranges during fruit development.
Citrus Leaves, 1955, **35** (2): 12-13.
Index of orange fruit maturity.
Calif. Agric., 1955, **9** (3): 13.

In investigations on the composition of the juice of freshly harvested Valencia and Washington navel oranges it was found that fluctuations in the gamma-amino butyric acid/acid ratio and in the "cloud" (turbidity due primarily to insoluble pectic materials)/ acid ratio were much greater than those found in the total soluble solids/acid ratio commonly used as a measure of maturity. Similar fluctuations from one sample to the next occurred in the various free amino acids found in the juice. Studies in changes in composition are continuing which will, it is hoped, yield information of value for the practical determination of maturity.

2045. Ting, S. V.
Chemical changes in citrus fruit during maturation.
A.R. Fla agric. Exp. Stats 1952/53, pp. 214-15.

Exploratory studies were made in 1952/53 on chemical changes occurring in the organic acids, the amino acids and the pectic substances in Valencia oranges and in the naringin of Ruby and Marsh grapefruit during maturation. *Orange.* The only organic acids found were malic and citric acid. The former increased until March and then decreased. The latter decreased continuously. Amino acids found were proline, arginine. asparagine, aspartic acid, glutamic acid, serine, gamma amino butyric acid and alamine. Their seasonal trends are given. No seasonal changes were found in any of the 3 pectic materials, namely water-soluble pectin, the pectates and the protopectin. *Grapefruit.* Naringin was high in Ruby picked in August, fell in September and then remained constant. In Marsh it remained constant from November to March.

2046. Kesterson, J. W., and Hendrickson, R.
Naringin, a bitter principle of grapefruit. Occurrence, properties and possible utilization.
Bull. Fla agric. Exp. Stats **511,** 1953, pp. 35, bibl. 33, illus.

An investigation of the glucoside content of grapefruit and shaddock led to the following conclusions: The quantity of naringin in grapefruit and shaddock fruit was found to remain constant once the fruit had grown to 2 in. in equatorial diameter. Thereafter, as the fruit grew larger, the naringin content on a percentage basis became lower. The glucoside content varied from 6·2 to 1·8 g. per fruit, with shaddock having the most and Thompson grapefruit the least. On a percent by weight basis, Ruby Red grapefruit contained the highest percentage of naringin. The unusually high naringin content of 40 to 75% on a dry-weight basis in small fruit indicates that its physiological function may be important, although this has not been investigated. The percent by volume of naringin in the juice could not be correlated with fruit maturity. It was found to vary between the limits of 0·02 and 0·03% throughout the entire season. Almost 90% of the total naringin present in grapefruit and shaddock was found in the albedo, rag and pulp. Analyses of the component parts of the fruit established that the albedo and flavedo accounted for a uniform percent of the fruit, while juice content increased or decreased at the expense of the rag and pulp. The range in the moisture content of the component parts, the distribution of naringin in the component parts, and percentage of the component parts comprising the whole fruit was determined for five varieties of grapefruit and Thong Dee shaddock. Possible uses for naringin as a fine organic chemical include the preparation of acid azo dyes and wood stains, vitamin P, rhamnose, p-coumaric acid and phloroglucin. It is also used to enhance the piquant flavour of confections and beverages. [Authors' summary.]

2047. Sinclair, W. B., and Crandall, P. R.
Pectic substances of juice vesicles of grapefruit.
Bot. Gaz., 1954, **115**: 371-9, bibl. 10.

Calcium pectate from water-soluble pectic substances amounted to 11·78% of the alcohol-insoluble solids, and that from acid-soluble materials to 24·81%.

Citrus—packing and storage.

(*See also* 1351, 2304.)

2048. Walsh, J. C.
Case types. Review of containers used for U.K. citrus imports favors California-type instead of dump bushel*.
Citrus News, 1954, **29**: 131-3, illus.

The many types of container used for sweet oranges, lemons, grapefruit, sour oranges, mandarins and clementines shipped by various countries to the U.K. are described with details of their dimensions. For oranges and grapefruit there is a distinct trade preference for the Californian citrus box, while for lemons the half-box size carton is proving popular.

2049. Grierson, W., and Newhall, W. F.
Degreening of citrus fruits.
A.R. Fla agric. Exp. Stats 1952/53, pp. 206-7.

Progress with the search for an accelerator for the ethylene degreening process or a substitute for ethylene, and with humidity tests is described briefly. In tests 85° F. was found to be the best temperature for Hamlin and Valencia oranges. A special investigation on degreened Temple oranges rejected in a northern market showed that ethylene treatment can result in delayed burn.

2050. Loest, F. C.
Investigations of the cause(s) of citrus fruit decay in the United Kingdom and on the Continent during June and July 1954.
Citrus Gr, 1954, No. 249, pp. 1-4.

The main cause of wastage found in several consignments of Navel oranges shipped from South Africa to the U.K. during the first 7 to 10 days ex ship was green mould, *Penicillium digitatum*. Some *Diplodia* stem-end rot was also present. An association between green mould development and the presence of insect "stings", suggests that the present method of detecting stings in a bubble bath requires re-examination. The investigation emphasized the value of dipping the fruit in a warm solution containing Dowicide A and 2,4-D and wrapping them in diphenyl wraps. More limited observations on lemons and naartjies [tangerines] showed *Diplodia natalensis* to be relatively more prevalent than in Navels and stressed the need to use 2,4-D dips and diphenyl wraps. [See also *H.A.*, 24: 4246.]

2051. Hopkins, E. F., Loucks, K. W., and McCornack, A. A.
Decay control research.
A.R. Fla agric. Exp. Stats 1952/53, pp. 207-10, illus.

Dowicide A - hexamine. Treatment in which the fungicide was not rinsed off caused a slight dulling of the lustre in the waxing treatment. Experiments were therefore made on rinse treatments in a 2 and 4% dip at 90° and 110° F. of degreened and non-degreened oranges, all fruits receiving a colour application and solvent wax treatment as in commercial practice. In all cases shine in the rinse lots was equal to that in the controls. All treatments gave excellent decay control for a 2-week holding period at 60° or at 70° F. At the higher holding temperature the higher concentration and temperature of dip did not increase effectiveness, but double dipping was beneficial. *Ammonium bicarbonate.* Vapour from dry ammonium bicarbonate reduced decay by 71% in a 2-week and by 67% in a 3-week storage test at 70° F. and was as efficacious as the standard Dowicide A-hexamine rinse treatment for 3 weeks' holding. Moistening the ammonium bicarbonate increased its effectiveness. The 2 treatments combined gave 90% control for 3 weeks. Ammonium bicarbonate controlled both *Penicillium digitatum* and stem-end rot.

2052. Long, J. K., and Roberts, E. A.
New dip treatment for control of green mould in oranges.
Agric. Gaz. N.S.W., 1954, **65**: 394-5, 412-13, illus.
Long, J. K.
New dip. Recommendations from the Gosford Laboratory for the control of green mould in oranges.
Citrus News, 1954, **29**: 136-7.

Very effective control of wastage in oranges due to green mould, *Penicillium digitatum*, has been obtained in a large commercial trial by dipping the fruit in a solution of 2 lb. sodium ortho-phenyl-phenate in 10 gal. water. The method of preparing the solution and of maintaining its pH above 11·7 to avoid rind injury are described. The cost of the treatment, estimated at $\frac{9}{10}$d. per case was much lower than that of the previously recommended borax-boric acid and waxing treatment. [See also *H.A.*, 24: 1885.]

2053. Strickland, A. G.
South Aus. Department report on trials and investigations in progress on citrus fruits.
Citrus News, 1954, **29**: 122.

Storage, packing and transport: Oranges have been held at 31°–32° F. for up to 14 days without low temperature injury. Wastage was reduced by sweating and waxing and by diphenyl wraps, was increased by borax-boric acid treatment and was not consistently reduced by 2,4,5-T post-harvest dips. Volume-fill cartons shipped to New Zealand did not stand up to normal handling and 3% of the fruit was lost through mechanical injury. Pre-harvest sprays of bordeaux mixture and 2,4,5-T did not affect wastage. Terpineol, tested as a substitute for diphenyl, injured fruit when used at a concentration of 100 mg. per wrap. *Other investigations in progress:* These include trials with Zn, Zn-Mn and Cu sprays and studies on root rot development in relation to excess soil water and on factors affecting injury resulting from the use of white oil sprays.

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* Abridged from an initial report.

2054. Giré, C., and Clabé, J.
L'emballage anti-fongique des agrumes. **(Anti-fungal wraps for citrus.)**
Emballages, 1954, **24** (144): 35-6, from abstr. in *Fruits d'Outre Mer*, 1954, **9** (9), *Suppl. Fruits trop. subtrop.*, No. 11-8461.

Experiments with diphenyl, salicylanilide and some quaternary ammonias for impregnating paper wraps for citrus showed that the best was Céquartyl B.I. (Fruits Pack). The experimental data are tabulated.

2055. Masago, H., and Akai, S.
Studies on storage rot of oranges. (II.) Preliminary investigation of sugar consumption by fungi cultured in Unshū orange juice. [Japanese, with English summary 10 lines.]
J. hort. Ass. Japan, 1954, **23**: 103-4, bibl. 1.

Paper-chromatographic analysis showed that Unshū orange juice contained sucrose, glucose, fructose and xylose. When cultured in Unshū orange juice *Aspergillus niger* used sucrose and then xylose, *Rhizopus nigricans* used fructose followed by xylose and then sucrose, and *Cephalothecium roseum* first used sucrose. Uronic acid, perhaps in the form of galacturonic acid as a decomposition product of pectin, was found 3 and 10 days after culture began but not after 20 days.

2056. Masago, H., and Akai, S.
Studies on storage rot of oranges. (III.) Effect of summer orange oil on the growth of the causal fungi. [Japanese, with English summary 7 lines.]
J. hort. Ass. Japan, 1954, **23**: 105-7, bibl. 4, illus.

A volatile substance, possibly n-decylaldehyde, found in summer orange oil, inhibited spore germination and mycelial growth in *Aspergillus niger*, *Rhizopus nigricans*, *Cephalothecium roseum* and *Cochliobolus miyabeanus*.

Dates.

(*See also* 1281, 2096b, e, g, m, y, z.)

2057. Hilgeman, R. H.
The differentiation, development and anatomy of the axillary bud, inflorescence and offshoot in the date palm.
Rep. 31st annu. Date Grs' Inst., Coachella, 1954*, pp. 6–10, illus.

Offshoot differentiation normally occurs only on young palms. A series of buds subtended by small, slowly enlarging leaves differentiate simultaneously, but development is slow until the pinnae of the subtending leaf become functional. Inflorescence differentiation normally occurs on mature palms at the end of October. The number of buds which differentiate is influenced by carbohydrate accumulation between June and October, which in turn is influenced by the leaf/fruit ratio at that time. Inflorescence spikes differentiate first in November, followed by axis elongation during December, with differentiation of the flower parts occurring in January.—Ariz. Citrus Exp. Stat., Tempe.

2058. Went, F. W., and Darley, E.
Root hair development on date palms.
Rep. 30th annu. Date Grs' Inst., Coachella, 1953, pp. 3-5, bibl. 6, illus.

No root hairs were found on Deglet Noor plants grown with their roots in a spray of nutrient solution. The authors conclude that the date is adapted to very wet soils and therefore needs abundant irrigation.—Calif. Inst. Tech., Pasadena and Univ. Calif., Riverside.

2059. Furr, J. R., and others.
An irrigation and fertilization experiment with Deglet Noor dates.
Rep. 28th annu. Date Grs' Inst., Coachella, 1951, pp. 17-20 [received 1955].

An irrigation and N fertilization experiment with 9-year-old Deglet Noor dates was started in California in 1944. The soil moisture supply of a "dry" irrigated plot was reduced just before and during fruit ripening, but during the rest of the year and in a "wet" plot ample water was given. Each irrigation plot was divided into an unfertilized control and a fertilized plot, which received 6–8 lb. N per tree annually. The dry treatment had little effect on the increase in tree height, and reduced leaf growth in the dry period was made good by faster growth during the rest of the year. The dry treatment had no significant effect on inflorescence production nor on fruit yield and quality; it slightly delayed the time of pollination, but also slightly hastened fruit ripening. During the last 4 years of the experiment the fertilized trees showed about 20% greater trunk growth, inflorescence production and fruit yield than unfertilized trees. In general, fruit quality from fertilized plots was not appreciably different from that of the controls.—U.S. Date Gdn, Indio, Calif.

2060. Furr, J. R., Currlin, E. C., and Armstrong, W. W.
Effects of water shortage during ripening and of nitrogen fertilization on yield and quality of Khadrawy dates.
Rep. 29th annu. Date Grs' Inst., Coachella, 1952, pp. 10-12, bibl. 1 [received 1955].

Irrigation and fertilizer experiments were conducted on Khadrawy dates between 1947 and 1951. The "wet" irrigation plots received ample water, while in "dry" plots water was withheld for 2–3½ months just before and during the fruit ripening period. Fertilized plots received 8 lb. inorganic N per tree. On all plots a cover crop of sweet clover was grown during winter and spring and then disced in. In general, leaf growth rate was reduced only during the dry period, but total growth for the year was the same for the dry as for the wet treatment. There were no significant differences between treatments in annual trunk growth or in fruit yields and grades.—U.S. Date Garden, Indio, Calif.

2061. Furr, J. R., and Cook, J. A.
Nitrogen content of pinnae, fruit, and seed of Deglet Noor and Khadrawy date palms as as related to nitrogen fertilization.
Rep. 29th annu. Date Grs' Inst., Coachella, 1952, pp. 13-14, bibl. 5 [received 1955].

Nitrogen analyses were made of the pinnae, fruit pulp and seeds from Deglet Noor and Khadrawy palms in a nitrogen manuring experiment [see two preceding abstracts]. In Deglet Noor the N percentages in samples from fertilized trees were significantly higher than in those from unfertilized trees. In some cases there was also a positive correlation between the N percentage in the pinnae and fruit yields. In Khadrawy, N manuring caused a small but significant increase in the N content of the pinnae, but differences in the fruit pulp and seed content were not significant.—U.S. Date Garden, Indio, Calif.

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* The Bureau is grateful to Dr. J. R. Furr for making available these reports of the Date Growers' Institute. It is hoped to receive them regularly in future.

2062. SHARPLES, G. C., AND HILGEMAN, R. H.
The influence of irrigation and bunch management upon shrivel of the Maktoom date.
Rep. 28th annu. Date Grs' Inst., Coachella, 1951, pp. 9-11, bibl. 4 [received 1955].

Three methods of irrigating Maktoom date palms were tested over a 2-year period. 1. Palms grown with a high soil moisture level produced large, late-ripening fruit which sustained heavy losses from shrivel and blacknose. Maximum palm growth, leaf development and inflorescence development occurred in these palms. 2. Palms grown with a high soil moisture level in early summer and a low level between August and November produced slightly smaller, earlier-ripening fruit which suffered smaller losses from shrivel and blacknose than with treatment 1. Palm growth and leaf development were less than in 1, but inflorescence development was equal. 3. Palms grown with a low level of soil moisture produced early-ripening, small fruit which sustained very light losses from rain damage and shrivel. Palm growth, leaf development and inflorescence production were markedly less than in treatment 1. Protection of bunches with paper bags significantly reduced blacknose but not shrivel.—Ariz. Citrus Exp. Stat., Tempe.

2063. ALEXANDER, D. B. W.
A method of pollinating dates.
Rep. 29th annu. Date Grs' Inst., Coachella, 1952, p. 20, illus. [received 1955].

A simple device is described and illustrated, by means of which pollen is blown into the newly opened bunches.

2064. NIXON, R. W.
Fruit thinning experiments with the Medjool and Barhee varieties of dates.
Rep. 28th annu. Date Grs' Inst., Coachella, 1951, pp. 14-17 [received 1955].

In experiments with Barhee the tips of the flower strands were cut back at pollination to remove about a quarter of the flowers or fruits on each bunch. Further thinning was done after pollination, the most satisfactory procedure being to remove about 50% of the total number of strands from the centre so that not more than 50 to 60 strands were left. With the Medjool variety uniform fruits of a large size were obtained by thinning to 20 fruits per strand, leaving not more than about 45 strands per bunch.—U.S. Date Gdn, Indio, Calif.

2065. SHARPLES, G. C., AND HILGEMAN, R. H.
Progress report: effects of hormone spray applications upon the development and ripening of date fruit.
Rep. 27th annu. Date Grs' Inst., Coachella, 1950, p. 14, bibl. 5 [received 1955].

Hormone solutions at concentrations of 20 and 500 p.p.m. were applied to pollinated date bunches of the Sayer variety at 3 stages of fruit development. The materials used were the sodium salt of 2,4-D, NAA, CPA and IBA. No stimulatory effect on growth or ripening was observed.—Ariz. Citrus Exp. Stat., Tempe.

2066. FURR, J. R., AND ARMSTRONG, W. W.
An investigation of the relation of frequency of picking Deglet Noor dates to grades, picking costs, and returns.
Rep. 31st annu. Date Grs' Inst., Coachella, 1954, pp. 10-12.

The effect of frequent picking was studied with 7- to 10-year-old Deglet Noor palms, which all received the same cultural treatments. Frequent picking did not result in an appreciable improvement in grades and the differences in returns for choice and standard grades were not usually enough to compensate for the added cost.—U.S. Date Gdn, Indio, Calif.

2067. COOK, J. A., AND FURR, J. R.
Sugars in the fruit of soft, semi-dry, and dry commercial date varieties.
Rep. 29th annu. Date Grs' Inst., Coachella, 1952, pp. 3-4, bibl. 6 [received 1955].

The moisture content and percentages of invert sugars, sucrose and total sugars are given for stored samples of 16 commercial date varieties [see also *H.A.*, 24: 806].—U.S. Date Gdn, Indio, Calif.

2068. PATRON, A., PATRON, S., AND SWINZOW, H.
La composition chimique des dattes marocaines considérée du point de vue de leur valeur alimentaire. **(The chemical composition of Moroccan dates considered from the standpoint of their food value.)**
Fruits d'Outre Mer, 1954, **9**: 443-9, bibl. 3.

The following data are given for 10 varieties of date grown in Morocco: percentage pulp yield, sugars/moisture ratio, content of reducing, non-reducing and total sugars, protein, ether extract, ash percentage, alkalinity of ash, Ca, Mg, P, Fe, Mn, Ca/Mg and Ca/P.

2069. RYGG, G. L.
Relation of dry texture in Deglet Noor dates to high spring temperature.
Rep. 31st annu. Date Grs' Inst., Coachella, 1954, pp. 4-5, bibl. 2.

Studies of spring temperatures recorded in the Coachella Valley during 1930 to 1953 showed that there was a relation between date texture and the average maximum temperature in the latter half of April or in May. A high percentage of dry-textured dates was produced in years when there were short periods of intense heat or protracted periods of moderately high temperature at this season. Laboratory experiments supported field observations that growing dates developed an increasing tolerance to high temperatures from the end of May onwards.—U.S. Dep. Agric., Pomona, Calif.

2070. DARLEY, E. F., AND WILBUR, W. D.
Progress report on rhizosis or rapid decline of the date palm.
Rep. 28th annu. Date Grs' Inst., Coachella, 1951, pp. 5-8, bibl. 4, illus. [received 1955].

The symptoms of rhizosis, which usually appear during the summer, are a sudden dropping of the fruit and wilting of the fruit strands, with wilting and death of the crown leaves. Root rot is also an early symptom. The cause is unknown, there appears to be no varietal resistance and no control is known. Copper sulphate applied to the soil in an attempt to protect healthy palms caused shedding of recently set fruit.—Calif. Citrus Exp. Stat., Riverside.

2071. Pereau-Leroy, P.
Variétés de dattier résistantes à la fusariose.
(Date varieties resistant to fusarium.)
Fruits d'Outre Mer, 1954, **9**: 450-1, bibl. 1.

Fusariosis (*Fusarium albedinis*), the bayoud disease, is the limiting factor in date production in Morocco at present and destroys thousands of palms each year. Chemical control experiments have been unsuccessful and varietal resistance is being studied as a means of control. Notes are given on resistant dessert and processing varieties.

2072. Vincent, L. E., and Lindgren, D. L.
Malathion dust for control of nitidulid beetles and pyralid moths infesting Deglet Noor and Khadrawi dates in the Coachella Valley.
Rep. 31st annu. Date Grs' Inst., Coachella, 1954, p. 28.

In commercial experiments 2 Deglet Noor gardens and 1 Khadrawi garden were each treated with 2, 3 and 4% malathion at 40 lb. per acre, dusted on to the bunches about 3 weeks before the first picking. In Deglet Noor gardens nitidulid beetle infestations were reduced from an average of 6% to 0·6%, and moth infestations were reduced from 3 to 0·1%. In the Khadrawi garden the average infestation of nitidulid was reduced from 21·2% to 0·8% and of moth from about 4% to 0%. The 2% dusts were less effective than the 3 and 4% dusts.—Calif. Citrus Exp. Stat., Riverside.

2073. Tinkham, E. R.
The control of date beetles by eye gnat larvacides.
Rep. 31st annu. Date Grs' Inst., Coachella, 1954, pp. 12-13.

Large scale soil treatments to control eye gnat larvae were carried out using emulsions and wettable powders of aldrin, BHC, chlordane, dieldrin and heptachlor at 2–3 lb. of the actual chemical per acre. DDT applied at 8–22 lb. per acre gave 80% control, but was too costly. After 28 months aldrin and heptachlor had given 94–95% control of the larvae, dieldrin 90%, chlordane 89%, but BHC only 34% control. Emulsions were better and more economical than wettable powders. Aldrin also gave 80% control of date beetles; results with dieldrin, heptachlor and chlordane were inconclusive.

2074. Smith, E. E.
Packing house experience in use of malathion for control of dried fruit beetle.
Rep. 31st annu. Date Grs' Inst., Coachella, 1954, p. 27.

Dried fruit beetle infestations were compared on fruit deliveries from 2 farms, one of which was dusted with 5% malathion 3 weeks before picking and the other only after the first picking had been completed. Treatment before picking was more effective, and is recommended for preventing excessive infestation of early pickings.

2075. Darley, E. F., and others.
Report on date fruit spoilage.
Rep. 29th annu. Date Grs' Inst., Coachella, 1952, pp. 4-5 [received 1955].

Several bunch treatments were tested for the control of fungus spoilage. The best control was obtained by combining the use of paper bags to protect the fruit from rain, insertion of wire rings to spread the strands and promote aeration, and dusting with Thiomate 19. A 2% parathion dust applied 2–3 weeks before the first picking considerably reduced infestations of nitidulid beetles. None of the acaricidal dusts tested nor a Systox spray were as effective as sulphur against date mite [*Paratetranychus simplex*].—Calif. Citrus Exp. Stat., Riverside.

2076. Sharples, G. C.
A study of spoilage and the microorganism population of soft dates.
Rep. 30th annu. Date Grs' Inst., Coachella, 1953, pp. 5-8, bibl. 7, illus.

Date spoilage was evaluated by studies of the population of micro-organisms present on the fruit. Larger numbers of yeasts and bacteria were present on the ripening fruit early in the season than later on. Fumigation with methyl bromide or Carboxide killed a large percentage of the micro-organisms. The population declined during cold storage at 32° F. or less. Fruit containing less than 30% moisture kept for 45–100 days before spoilage occurred. Considerable sugar spotting occurred in dates containing between 18 and 33% moisture, but storage at 0° F. or lower reduced this to a minimum.—Ariz. agric. Exp. Stat., Tucson.

2077. Rygg, G. L., and others.
Factors affecting the spoilage of dates at room temperature.
Rep. 30th annu. Date Grs' Inst., Coachella, 1953, pp. 10-14, bibl. 5.

Six date varieties with moisture contents ranging from 13 to 43% were stored at room temperature (about 66° F.) for various periods up to 208 days. Spoilage increased rapidly as moisture contents increased above 23%. Fruits were less subject to spoilage after steam hydration. Fumold, a mixture of 15% ethylene oxide and 85% methyl formate, reduced spoilage by micro-organisms but did not prevent or delay any deterioration due to darkening, loss of flavour and development of syrupiness. There were indications that increased flesh acidity often accompanied spoilage and darkening. Colour darkened progressively as the storage period increased. Moist dates darkened more rapidly than drier ones of the same variety.—Bureau Plant Ind., U.S.D.A.

Macadamias.

(*See also* 2096i.)

2078. Hamilton, R. A.
Macadamia: culture and management of young orchards.
Hawaii Fm Sci., 1954, **3** (2): 2-3, 8, illus.

Experience in Hawaii shows that young macadamia trees should be pruned to encourage the lowest branches to develop 2 to 2½ ft. above the ground. Of the 3 shoots with weak V-shaped crotches that are commonly produced in terminal flushes 2 should be removed leaving ½-inch stubs from the base of which further shoots emerge. Among the latter suitable shoots with wide-angle crotches can be left to form scaffold branches. Experience has also shown the need to establish windbreaks in exposed sites and to avoid the practice of grazing cattle in young macadamia orchards. Problems associated with weed control and inter-cropping are also discussed.

Olives.

(*See also* 1369, 2096c, v, w, 2097d, i.)

2079. Richardson, A. M., and Ross, A. A.
The olive.
Qd agric. J., 1954, **79**: 274-6, illus.

The olive is grown in Queensland for pickling. Hardy's Mammoth is the best variety; others of interest locally are Corregiolla, Mission, Nevadillo Blanco, Manzanilla and Sevillano. Notes are given on tree and soil management, harvesting and yields.

2080. Morettini, A., and Armellini, S.
Le varietà di olivo coltivate nella provincia di Ascoli Piceno. (**The olive varieties grown in the province of Ascoli Piceno.**) [English summary ¾ p.]
Ann. Sper. agrar., 1954, **8**: 1727-65, bibl. 14, illus.

Descriptions are given of 10 local oil varieties, of which Carboncella is by far the most important, and of Ascolana, the chief dessert variety. Oil varieties recently introduced from Tuscany include Frantoio, Moraiolo and Leccino. Notes are given on self-sterility and self-compatibility, frost hardiness, resistance to leaf spot (*Cycloconium oleaginum*), yields and oil contents.

2081. Elant, H.
La multiplication de l'olivier dans les pépinières de Pescia (Italie). (**Olive propagation in the nurseries of Pescia, Italy.**)
Terre maroc., 1954, **28**: 419-29, bibl. 2, illus.

The method of propagating olives by crown grafting on seedlings used at Pescia, an important Italian olive-propagating centre, and its application in Morocco are discussed. The chief rootstocks used are Frantoio and Moraiolo. The scion varieties preferred in various parts of Italy are named.

2082. Jacoboni, N.
La moltiplicazione dell'olivo con il metodo della "mezzaredda". (**Multiplying the olive by the mezzaredda method.**)
Ital. agric., 1954, **91**: 863-7, bibl. 18, illus.

A detailed description is given of a method of olive multiplication used in the Gargano peninsula in Apulia. Stumped root suckers of wild olive with the roots cut back are patch-budded and then forced by stratification for a month in a trench with farmyard manure in the bottom before transfer to the nursery.

2083. Bouat, A., Renaud, P., and Dulac, J.
Étude sur la physiologie de la nutrition de l'olivier (troisième mémoire). (**Study on the physiology of olive nutrition (third report).**)
Ann. agron., 1954, **5**: 459-89.

Leaf analyses were carried out on olive trees in a study of environmental and varietal influences. The following conclusions were drawn: (1) Varieties in the same environment and under the same cultural care showed very similar mineral contents, regardless of the method of tree propagation; (2) environmental differences cause great variations in the mineral content of the same varieties; (3) field classification of the agronomic condition of the groves was confirmed by laboratory analysis; (4) bark ringing divided the branch into 2 separate parts, one ageing and the other rejuvenated; (5) a problem arising from leaf analysis is whether the N increase observed in a manured tree is real or only relative; (6) the experimental optimum nutrient level was N 2·10%, P_2O_5 0·35%, and K_2O 1·05% of dry matter. [See also *H.A.*, 23: 2208, and 24: 820.]

2084. Sammaini, L.
La concimazione azotata ritardata all'olivo osservata nel tempo e nello spazio. Parte I. Risultati di cinque anni di sperimentazione. Parte II. Risultati del sesto anno di sperimentazione. (**Delayed nitrogenous fertilization of the olive tree observed in time and space. I. Results of 5 years' experiments. II. Results of the 6th year of the trial.**) [English summaries 8 and 5 lines.]
Ann. Sper. agrar., 1954, **8**: 1887-1927, bibl. 3, 1955, **9**: 21-43, illus.

Part I describes experiments in Lazio in 1948/52 in which adult Canino olive trees received heavy or moderate dressings of calcium nitrate, 8 or 4 kg. per tree, in February or April/May. Delayed fertilization broke biennial bearing and increased yield. Yields were not directly related to the rate of fertilization but depended chiefly on the biological phase of the tree at the time of fertilization. Part II gives the 6th year's (1953) results, the responses of the varieties Moraiolo, Frantoio, Bolsone and Palmarino to the treatments and tables and graphs covering the whole period of the experiment. In 1953 heavy delayed fertilization gave as high yields as in 1952, moderate delayed fertilization proved insufficient, and the 2 early treatments and the control all showed biennial bearing.

2085. Rui, D., Ciferri, R., and Scaramuzzi, G.
La leptonecrosi dell'olivo da carenza di boro. (**Olive leptonecrosis and boron deficiency.**)
Ital. agric., 1954, **91**: 935-9, illus.

Information is given on external and internal symptoms and on control experiments made in 1952/54. The amount of B required for control varies widely with age, soil, variety and environment. In Verona the application of B with the regular NPK fertilizer in February/March has given the best results. Doses recommended are 17·5 g. boric acid for 3-year-old trees, 28 g. for 7- to 8-year-old trees and 190 g. for trees over 40 years old.

2086. Francesconi, F.
Sul comportamento all'essiccazione delle foglie di razze diverse d'olivo. (**On the behaviour in drying of the leaves of certain olive varieties.**) [English summary 14 lines.]
Ann. Sper. agrar., 1955, **9**: 209-20, bibl. 9.

In tests in 1952 the rate of drying of detached olive leaves of 4 varieties was a function both of their initial moisture content and their soluble sugars content, leaves with a relatively high initial moisture content and low sugers drying first. In tests on the Moraiolo variety in 1954 rate of drying was a function of soluble sugars content but not of moisture content.—Ist. Colt. arb., Univ. Perugia.

2087. M., M.
La difesa dell'olivo dall'eccesso di calura. **(Protecting the olive tree from excessive heat.)**
Ital. agric., 1954, **91**: 617-19, illus.

In Apulia earth is heaped round the trunk and under the skirt of the olive tree in summer to protect the roots from heat and to conserve moisture. In the northern olive-growing districts the same practice is used in winter to protect the roots from cold.

2088. Ragazzi, G.
Un commodo attrezzo per la raccolta delle olive. **(A useful olive harvester.)**
Macchine e Mot. agric., 1954, **8**: 81-4, from abstrs in *Olearia*, 1954, **8**: 172 and in *Terre maroc.*, 1954, **28**: 465-6.

The new Italian Sofalk, hand-operated, olive harvester, designed to pick up the fruit from the ground, consists of a metal container at the end of a handle. The downward face of the container has a curved frame across which a series of well sprung parallel steel wires are stretched. When the operator presses the container on to the ground the olives are forced through the wires and jump into the container. Three frames with wires at different spacings for large, medium and small fruit are available. The tool harvests as much as 5 men picking by hand.

2089. Graniti, A.
La "lebbra" delle olive. **(Olive anthracnose.)**
Ital. agric., 1954, **91**: 945-8, bibl. 10, illus.

Gloeosporium olivarum, which causes serious olive fruit rot and defoliation in Italy, was recently recorded in Sicily [*H.A.*, 24: 4257]. A control experiment was made at Cassaro in 1953 on Tonda Iblea olive trees which had been heavily infected the year before. Bordeaux mixture at 1% plus a wetter-sticker was applied at 12 l. per tree per treatment in late September, mid-October, early November (soon after the fruit had begun to colour) and late November. In the treated plot the percentage of infected fruit was 0·32 compared with 20 in the control and the fruits were more numerous and heavier. In a clean sample from the treated plot and an infected one from the control the total acidity, in terms of oleic acid, was 0·72 and 3·78% respectively. It is considered that at Cassaro at any rate the September and late November treatments could safely be omitted.—Ist. Pat. veg. Univ. Catania.

2090. Melis, A.
Esperienze di lotta contro la mosca delle olive (*Dacus oleae* Gmel.) in Italia nel 1953. **(Experiments on the control of *Dacus oleae* in Italy in 1953.)**
Redia, 1954, **39**: 37-74, from abstr. in *Olearia*, 1954, **8**: 173.

In experiments made on the control of *Dacus oleae* in all parts of Italy in 1953 under the direction of the Florence Agricultural Entomology Station good results were obtained with arsenical poison bait alone, with poison bait plus bottle-trapping, with poison bait plus one phosphoric ester spray, and with DDT or phosphoric ester alone without bait. In the case of baits alone re-invasion occurred after the beginning of October, especially in the south, but there was a clear difference between treated and untreated areas up to November in all regions. It is recommended that the classic Berlese method should be modified by increasing the treatments from 6 to 10 so that they can be applied fortnightly from late June to early November, including 3 in October.

2091. Kuzmić, N.
Opažanja iz biologije i suzbijanja maslinove mušice. **(Observations on the biology and control of *Dacus oleae* Rossi on the island of Lokrum in 1953.)** [English summary 1¼ p.]
Zasht. Bilja, 1954, No. 25, pp. 45-52, bibl. 6.

Details are given of control trials on olive fruit fly infesting 2 olive groves situated on Lokrum. In one grove a DDT preparation was applied as a 10% solution by a knapsack sprayer, while in the other DDT dust was applied by a motor-duster. From 28 June to 7 October 7 spray and 13 dust treatments were carried out, using 2 l. of liquid and 0·30 kg. of dust respectively per tree per treatment. A reduction of insect populations occurred after each treatment, but flies were present during the whole time and were being trapped till the middle of January. The final results have shown that the dust was more effective than the spray.

Passion fruit.

2092. Wills, J. M., and Stephens, S. E.
Passion fruits and granadillas.
Qd agric. J., 1954, **79**: 205-17, illus.

The culture of the purple passion fruit is fully described. The golden passion fruit (*Passiflora edulis* var. *flavicarpa*), the bell apple (*P. laurifolia*) and large and small fruited granadillas (*P. quadrangularis*), which require more tropical conditions, are grown in Northern Queensland. The hard-shelled passion fruit (*P. maliformis*) has little value as a commercial fruit.

Persimmons.

(*See also* 1282, 1365.)

2093. Corrao, A.
La pectina libera dei frutti di *Diospyros kaki* L. **(The free pectin in persimmon fruits.)** [English summary ½ p.]
Ann. Sper. agrar., 1954, **8**: 1675-83, bibl. 16.

The chemical and colloidal characters of the free pectin in ripe persimmon fruits are described. The non-pectic materials associated with the free pectin on hydrolysis produced arabinose, galactose, xylose and rhamnose.

Tung.

2094. Dickey, R. D., Gilbert, S. G., and Gropp, C. M.
The genus *Aleurites* in Florida: Part I. Botanical characteristics; Part II. Chemical and physical characteristics of the oils.
Bull. Fla agric. Exp. Stats **503**, 1952, pp. 40, bibls 33+5, illus. [received 1955].

In Part I taxonomic characters are described to aid in the identification of *Aleurites fordi*, *montana*, *cordata*, *moluccana* and *trisperma*. In Part II data are presented on the chemical and physical characteristics of the oils from these 5 species.

2095. DICKEY, R. D., AND BLACKMON, G. H.
Tung production.
A.R. Fla agric. Exp. Stats 1952/53, p. 106.
December-January temperatures which included 470 hours at 45° F. or lower adequately met the chilling requirements of tung in the Gainesville area in the winter of 1952–53, as evidenced by even bud break and vigorous growth starting about mid-February. Small 2-year-old tung trees developed toxicity symptoms less than 6 days after applications of 1, 2 and 3 oz. of copper sulphate per plant.

Noted.

2096.

a BITTERS, W. P., AND OTHERS.
Troyer citrange rootstocks.
Calif. Citrogr., 1954, **40**: 46, 59-61, bibl. 9, illus.
Limitations in the use of Troyer citrange rootstock.
Citrus Leaves, 1955, **35** (2): 10-11, 26, bibl. 9, illus.
Experience reviewed.

b BROWN, T. R.
Cleaning dates in the small packing house.
Rep. 31st annu. Date Grs' Inst., Coachella, 1954, p. 27.
With compressed air followed by fog spraying.

c DEL CAMPO, E.
El olivo en España. **(The olive in Spain.)** [English summary ½ p.]
Bol. Oleic. int., 1954, **4** (23): 19-32, bibl. 3.

d COMELLI, A.
L'avocatier en Floride. **(The avocado in Florida.)**
Fruits d'Outre Mer, 1954, **9**: 395-414, illus.
A detailed account.

e DILLMAN, R. S.
A method for removing non-commercial date palms.
Rep. 30th annu. Date Grs' Inst., Coachella, 1953, p. 9.
At a cost of $135 per acre for 20-year-old palms.

f FLESCHNER, C. A.
Looper on avocado controlled by parasites.
Citrus Leaves, 1954, **34** (12): 28, illus.
Two parasites of avocado looper.
Calif. Citrogr., 1955, **40**: 114-15, illus.
Natural control of *Sabulodes caberata*.

g GIMINGHAM, C. H.
A note on water-table, sand movement and plant distribution in a North African oasis.
J. Ecol., 1955, **43**: 22-5, bibl. 2.
The plants include date palms.

h HALMA, F. F., ZENTMYER, G. A., AND WILHELM, S.
Verticillium wilt of avocados.
Calif. Citrogr., 1954, **40**: 69-70, bibl. 4.
See *H.A.*, 24: 4175.

i HAMILTON, R. A.
Nut cracker.
Hawaii Fm Sci., 1954, **3** (2): 5-6, illus.
For macadamias; very similar to that mentioned in *H.A.*, 24: 4254.

j HARDING, R. B.
Surface accumulations of nitrates and other soluble salts in California orange orchards.
Proc. Soil Sci. Soc. Amer., 1954, **18**: 369-72, bibl. 7.
In irrigated areas, especially those not tilled.

k HARRINGTON, F. B.
Cherry of the Rio Grande.
Fmrs' Weekly, S. Afr., 12 Jan., 1955, p. 57.
Notes on *Myrciaria edulis*.

l HENDRICKSON, R., AND KESTERSON, J. W.
A survey on recovery of citrus glucosides.
Citrus Ind., 1955, **36** (2): 7, 9-10, 18, bibl. 8.
From waste citrus peel.

m HILGEMAN, R. H.
The anatomy and development of the leaf and stem of the date palm.
Rep. 28th annu. Date Grs' Inst., Coachella, 1951, pp. 11-14, bibl. 4, illus. [received 1955.]

n JOHNSTON, J. C., AND MOORE, P. W.
Pruning citrus trees.
Calif. Citrogr., 1955, **40**: 83, 98, 100.

o JOINER, J. J.
Lychee production in Florida.
Citrus Ind., 1955, **36** (1): 24-5, 28-9.
Acreage 260 in 1953; cultural needs outlined.

p JONES, W. W., AND CREE, C. B.
Effect of time of harvest on yield, size and grade of Valencia oranges.
Citrus Leaves, 1954, **34** (11): 8-9, bibl. 6.
Harvest time affects Valencias.
Calif. Agric., 1955, **9** (1): 11.
See *H.A.*, 25: 951.

q JOUBERT, G. F.
Sitrusgronde en voedingsprobleme in die Citrusdal streek. **(Citrus soils and nutritional problems in the Citrusdal area.)**
Citrus Gr, 1955, No. 252, pp. 3-6, 12.
Including minor element deficiencies.

r KERR, G. E. K.
Mandarins. Melbourne buyers' reactions to different types marketed under restricted supply conditions.
Citrus News, 1954, **29**: 134-5, 139.
Notes on 11 varieties.

s KHAN, M. A.
Fruit industry in economy of Pakistan.
Punjab Fruit J., 1954, **18** (66/7): 8-12, bibl. 8.

t LEDIN, R. B.
Sub-tropical crops of minor importance. Naranjilla.
A.R. Fla agric. Exp. Stats 1952/53, p. 315.
Solanum auriculatum promising as a rootstock for *S. quitoense*.

u Levitt, E. C.
Renovation of citrus trees.
Agric. Gaz. N.S.W., 1954, **65**: 343-8, 432-9, illus.
Reasons for, and methods, in N.S.W.

v Maugini, A.
L'olivicoltura nella Repubblica Argentina. (**Olive growing in the Republic of Argentina.**) [English summary 6 lines.]
Riv. Agric. subtrop., 1954, **48**: 199-217, illus.

w Mazzocchi, G. B.
Arboricultura sul Gebel Garian (Tripolitania). (**Fruit tree growing in the Gebel Garian, Tripolitania.**) [English summary 3 lines.]
Riv. Agric. subtrop., 1954, **48**: 341-50.
Notably olives.

x Moore, P. W., and Nauer, E.
Some characteristics of mature California orange orchards.
Citrus Leaves, 1955, **35** (1): 6-7, 12-13, bibl. 2.
Results of a survey including observations on senility and factors associated with it.

y Nixon, R. W.
Off-type palms in commercial date gardens.
Rep. 30th annu. Date Grs' Inst., Coachella, 1953, pp. 8-9, bibl. 5.
Seedlings or mutants of Deglet Noor described.

z Nixon, R. W.
Date culture in Saudi Arabia.
Rep. 31st annu. Date Grs' Inst., Coachella, 1954, pp. 15-20, bibl. 12.

2097.

a Philippe, J.
Les agrumes aux États-Unis. (**Citrus in the United States.**)
Bull. agric. Congo belge, 1954, **45**: 1621-88, bibl. 89, illus.
In California and, more briefly, in Florida.

b Ramakrishnan, V.
Ecological aspects of citriculture in South India.
South Indian Hort., 1954, **2**: 121-41, bibl. 49.
A review.

c Rebour, H.
La fumure des arbres fruitiers. État de la question en Afrique du Nord. (**Manuring fruit trees. The problem in North Africa.**)
Jardins Fr., 1954, **127**: 215-31, illus.
Especially oranges and vines; see also *H.A.*, 23: 2216s.

d Renaud, M.
Les techniques modernes de la culture de l'olivier. (**Modern methods of olive growing.**)
Fruits et Prim., 1954, **24**: 285-93, bibl. 4, illus.
In Tunisia.

e Ross, A. A.
Fertilizing citrus trees.
Qd agric. J., 1954, **79**: 271-3.
In Queensland.

f Savage, Z.
Data on citrus production cost of groves over 10 years of age.
Citrus Mag., 1955, **17** (5): 14-15.
Costs and returns in Florida itemized per acre and per box.

g Schroeder, C. A.
Search for avocados in Mexico.
Citrus Leaves, 1954, **34** (12): 16-17, 30, 34, illus.
Notes on expedition which introduced 10–12 new types to California.

h Smirnoff, W.
Conseils d'organisation pour la lutte contre les cochenilles des agrumes. (**Recommendations for the control of citrus scales.**)
Fruits et Prim., 1954, **24**: 294-6.
General advice on preventive and control measures.

i Wilson, E. G.
Australian olives.
World Crops, 1955, **7**: 33-4, illus.
Production expanding and outlook promising.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 1582-1591, 1991, 2096s, 2261r, 2273, 2290, 2302, 2313, 2314a, e, f, g, h, m.)

2098. Blaich, O. P.
Agriculture in British Guiana, Census 1953, Vol. **1**, No. 2, pp. 22.

The data in this report are supplementary to those provided in 1952 [*H.A.*, 24: 4268] and do not furnish the same amount of detail. This issue is intended only to point out major changes during 1953 in the more important phases of farming. Acreages and production are given for the major crops.

2099. Nederlands Genootschap voor Landbouwwetenschap.
Nieuw-Guinea. (**Dutch New Guinea.**)
Landbouwk. Tijdschr.'sGrav., Nieuw-Guinea-Nummer, December 1954, pp. 71, illus.

Members of the Agrarian Commission for New Guinea, who recently visited the country, have contributed articles on the present position and future development of agriculture. Cacao appears to be a promising crop.

2100. Tai, E. A.
Some tropical fruits.
J. agric. Soc. Trin. Tob., 1954, **54**: 265-74.

Brief notes are given on some tropical fruits grown in Trinidad. The families concerned are Anacardiaceae, Annonaceae, Bromeliaceae, Caricaceae, Cucurbitaceae, Flacourtiaceae, Geraniaceae, Guttiferae, Lauraceae, Malpighiaceae, Myrtaceae, Palmae, Sapindaceae and Sapotaceae.

2101. Fahmy, I.
A study of the relation between carbohydrate content of scions and graft union in certain tropical fruit trees, and the diffusable auxin content of the scions.
Diss. Abstr., 1954, **14**: 748, being *Publ.* 7893 of 83 pp.

The significance of carbohydrates in graft takes was studied in sapodilla, macadamia, mango and canistel [*Lucuma nervosa*]. Three groups of scions were used, one as control, another being ringed before taking for grafting, and another pre-ringed plus IAA or MH or both. Sapodilla and canistel both showed positive relations between carbohydrates and graft unions, but macadamia and mango did not. The chemical treatments had no effect on graft union in any species. Some auxin diffusion was detected in sapodilla, mango and canistel.

2102. González Mendoza, R.
La mosca de las frutas (*Anastrepha* spp.). **(The *Anastrepha* fruit flies.)**
Agric. trop. Bogotá, 1954, **10** (9): 23-5, bibl. 1, illus.

The species of *Anastrepha* and the parasites of the genus that occur in Colombia are listed. Short biological notes are given on the flies and the following recommendations are made for their control: (1) where parasites are few, bury infested fruit or feed it to livestock before the larvae emerge; (2) where biological control is possible, store infested fruit in holes with special covers permitting egress of the parasites but not of the flies; (3) during the pupating season cultivate the soil beneath the trees and water abundantly every few days to cause late pupation near the surface. This will result in the destruction of many pupae; (4) destroy wild host plants or use them as traps. The possibility of biological control should be considered before insecticides are applied. The chlorinated hydrocarbons are efficacious against the adults, larvae and pupae as foliage sprays or applied to the soil.

2103. Parham, B. E. V.
Birds as pests in Fiji.
Agric. J. Dep. Agric. Fiji, 1954, **25**: 9-14, bibl. 8, illus.

Seven species of bird are listed as injurious to plantation, vegetable and fruit crops. Methods of control are discussed.

Bananas.

(*See also* 1287, 2260g, 2261b, n.)

2104. Ziv, D.
Chlorosis of bananas and other plants in Jordan Valley due to iron deficiency. [Hebrew.]
Hassadeh, 1954, **35**: 190-3, bibl. 7.

Bananas grown on chalky soils in the Jordan Valley suffer badly from chlorosis. The leaves on these plants are more closely bunched together, and chlorosis is worst in spring and autumn with often a temporary recovery in summer. Plants were sprayed with Zn, B, Fe, Mn and Cu sprays, but only Fe produced a response, treated plants becoming green and giving increased yields. Spraying with 0·4% $FeSO_4$ solution with a spreader should be done in spring and autumn. In the spring one spray is sufficient if the attack is slight, but with severely affected plants two or three sprays at intervals of 3–4 weeks are needed. In the autumn, one spray should suffice. H.C.R.

2105. Lulla, B. S., and Johar, D. S.
Organic acids in bananas.
Curr. Sci., 1954, **23**: 362, bibl. 10.

Extracts from green and ripened fruits of 9 indigenous banana varieties, 7 belonging to *Musa sapientum* and 1 each to *M. cavendishii* and *M. balbisiana*, were studied by chromatography. Only citric acid and 1-malic acid among the non-volatile acids were found in the fruits of each variety. Their presence was confirmed by chemical tests.

2106. Ulrich, R.
Transport, entreposage et maturation des bananes. **(Transport, storage and ripening of bananas.)**
J. Agric. trop. Bot. appl., 1954, **1**: 129-42, bibl. 33, illus.

Aspects dealt with in this review include optimum harvesting maturity, optimum conditions of temperature, humidity and ventilation during shipment, progress of ripening at 12° C., storage disorders and treatment of green bananas in ripening chambers after transport.

Cacao

(*See also* 2099, 2260d, f, k, l, n, p, q, t, x, 2261c, d, e, f, j, q, s, v, 2283, 2295.)

2107. Comite Técnico Interamericano del Cacao.
V Reunión del Comite técnico interamericano del Cacao. Vol. I. Trabajos presentados. Vol. II. Recomendaciones y trabajos adicionales presentados. **(Proceedings of the Fifth Meeting of the Interamerican Technical Committee on Cacao. Vol. I. Papers presented. Vol. II. Recommendations and further papers presented.)**
Instituto interamericano de Ciencias agrícolas, Turrialba, 1954, pp. not numbered serially, bibls, illus.

Volume I contains 26 papers in English, Spanish (with some English summaries) and French: 3 on nutrition and soil management, 5 on propagation, 2 on physiology, 10 on phytopathology, 2 on biochemistry, 1 on selection and 3 general.

The chief contents of Volume II are (1) 13 papers in Spanish and Portuguese: 1 on propagation, 2 on physiology, 2 on phytopathology, 4 on selection, 2 on botany, 1 on ecology and 1 general; and (2) the Committee's recommendations. The principal subjects on which recommendations were made are (1) selection: clone catalogue, clonal collection, identification of clones from floral characters, uniformity in expressing the efficiency of a method of propagation, nursery areas to supply cuttings, pests and diseases in relation to propagation, difficult-rooting clones, shade tree characters' catalogue, pruning clones, selection methods, clonal testing, breeding programme; (2) diseases and pests: identification and quarantine; (3) mineral deficiency tests: soil and leaf analysis pot tests, injections and field tests. [See separate abstracts of individual papers.]

2108. Erickson, A. L.
Facilities and projects of various agricultural institutions working on cacao in the Western Hemisphere.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 14.

Replies to a questionnaire sent out by the Inter-American Cacao Center to all known cacao research centres in the Western Hemisphere were received from the Western Caroline Islands, Grenada, Trinidad, Ecuador (2 centres), Colombia, Peru, Surinam, Mexico and Costa Rica. Some of the subjects on which information is provided in this paper are addresses, staffs, climate, finances, organization, laboratory facilities, research projects and training facilities.

2109. The Imperial College of Tropical Agriculture.
A report on cacao research 1953.
Imperial College of Tropical Agriculture, St. Augustine, Trinidad, and 40 Norfolk Street, London, W.C.2, 1954, 10½×8½ in., pp. 87, bibls, illus., 10s. 6d.

As many of the abstracts that follow testify the Cacao Research Scheme in Trinidad has continued to show substantial progress. Work under way but not described in detail includes stock-scion clonal grafts, the continuation of the breeding programme, the establishment of a second shade-spacing-fertilizer experiment and further studies on marginal leaf-scorch and iron chlorosis. Research contemplated includes fundamental studies on the physiology of growth, flowering and fruit setting.

2110. West African Cacao Research Institute (W.A.C.R.I.).
Annual Report West African Cacao Research Institute, 1953/54, Tafo, 1954, pp. 52, 5s.

The following are the main headings and subheadings: *Virus research* (swollen shoot): Field protection experiments, virus-vector relations, host range, strains, chemical tests for diagnosis, Nigerian substation isolates, mealybug vectors. *Capsid research:* Field studies, chemical control. *Soil Science:* Manuring of seedlings and of bearing trees. *Chemistry:* Fermentation, flavour assessment, analysis of insect secretions, cacao mucillage. *Botany and Physiology:* Routine propagation, clonal nursery, role of leaf in single-leaf cuttings, cambial tissue culture, biological assay of growth substances, bean germination, association of fungi and feeding roots, cherelle wilt, roots. *Plant Breeding:* Established trials, breeding programme. *Mycology:* Black pod, capsid-*Calonectria* control. *Mealybug studies:* Migration, prevention of swollen shoot disease, attendant ants, chemical and biological control of mealybugs, mealybug survey of Nigeria. *Agronomy:* Transplanting experiments, studies on yield, spacing, pruning, fermentation and quality, storage. The research programme is printed in full as an appendix.

2111. Burgos L., J. A.
Algunos resultados del trabajo experimental sobre cacao en la Estación Experimental Agrícola de Tingo María. (**Some results of cacao research at the Tingo María Agricultural Experiment Station, Peru.**)
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 16.

The clones growing at Tingo María Experiment Station are listed. Notes are given on propagation by grafting and by cuttings, the performance of Pound clones 7, 12 and 16, nitrogen and minor element nutrition studies, shade trees, and fermentation. In rooting tests in a Trinidad and modified Trinidad propagator on stem and leaf cuttings of Pound 7 treated beforehand with indolebutyric acid 4 treatments were applied, namely control, guano, warm water, guano plus warm water. In both propagators warm water gave the best results with stem cuttings (50 and 38% rooting) followed by guano (38 and 29%). In the Trinidad propagator guano plus warm water gave the best results with leaf cuttings (21%) followed by the control (17%). In the modified Trinidad propagator guano gave the best results with leaf cuttings (14%) followed by guano plus warm water (6%). Experiments on spacing, shading, mulching and methods of establishing cacao on forest land have recently begun.

2112. Thorold, C. A.
Observations on *Theobroma cacao* in Fernando Po.
J. Ecol., 1955, **43**: 219-25, bibl. 12, map.

Certain climatic effects with respect to Fernando Po cacao cultivations are described in relation to previous studies in Nigeria [see *H.A.*, 22: 4325]. There is further evidence that cacao yields tend to be inversely proportional to rainfall. Cacao epiphytes found in Fernando Po are listed. There are relatively few species in comparison with Nigeria. This disparity receives comment with respect to climatic differences and the adverse effects of fungicide applications. [Author's summary.]

2113. Baker, R. E. D., and others.
The Anglo-Colombian cacao collecting expedition.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 8-29, bibl. 7, illus.

This is the final report of the expedition, preliminary accounts of which have appeared earlier [see *H.A.*, 24: 1941]. It includes full notes, supplemented by photographs of pods and cushions, on the different forms of *Theobroma cacao* encountered and on 13 other species of *Theobroma* and 10 of *Herrania*, as well as on the insects, their parasites and predators, associated with these two genera, and on the incidence of witches' broom and monilia diseases. The expedition disclosed no facts that were not in accord with the hypothesis that the centre of origin of *Theobroma cacao* lies near the Colombian-Ecuadorian boundary on the eastern flanks of the Andes.

2114. GARCÍA, C.
Resultados de la selección de cacao en Colombia. **(Results of cacao selection in Colombia.)**
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 10.

Information is given on the progress and results of cacao selection in Colombia which began in 1943. Yields of beans per pod, pods per tree per annum and dry cacao per annum are given for a number of SCP (Selección Cacao Palmira), SCC (Cauca) and SCT (Tulúa) clones.

2115. CASTRO Z., H. U.
Comportamento del cacao clonal en algunas zonas del Ecuador. **(Performance of clonal cacao in certain districts of Ecuador.)**
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 12.

Information is given on yield, quality and resistance to diseases and pests and to drought and low atmospheric humidity in ICS 1, ICS 45, ICS 95, SCA 6, SCA 12, IMC 67, P 16 A and the local ERCA 1. Pruning, transport and planting practice and the rehabilitation of old plantations are described.—Empres. Renov. Cacao C.A., Guayaquil.

2116. IMLE, E. P., ERICKSON, A. L., AND OECHSLI, L. P.
Performance of clonal cuttings and clonal seedlings of cacao interplanted with rubber.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 11.

A small pilot test on the performance of interplanted rubber and cacao was planted at the USDA Regional Rubber Station at Turrialba, Costa Rica, in 1950. Three-component *Phytophthora*-resistant Brazilian hybrid rubber clones were planted at 6×10 ft. in double-row hedges 90 ft. apart. Seedlings and rooted cuttings of United Fruit Company cacao clones and seedlings from unselected seed were planted at 10×10 ft. in the strips between the rubber hedges, leaving 15 ft. between the rubber and the first row of cacao. These densities represent 145 and 304 plants per acre respectively for rubber and cacao or about 70% of the normal stand in each case. During the fourth year from planting U.F. 676 seedlings produced 50% more in weight of beans per tree than the next highest seedling. There were no large differences in production between the cuttings of 4 U.F. clones but they gave significantly higher yields than the unselected seedlings. No comments can yet be made on the advisability of interplanting cacao and rubber.

2117. LEÓN, J.
Una nota sobre "cacao lagarto" o pentagona. **(A note on *lagarto* or *pentagona* cacao.)**
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 4, bibl. 5.

The most distinct variant, both morphologically and geographically, among cultivated cacaos is the *lagarto* or *pentagona* type found in Costa Rica. Its characters are described. It is considered to be a subspecies and has affinities with the Criollos of Central America.

2118. MURRAY, D. B.
A new technique in the vegetative propagation of cacao.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 53-5, bibl. 1, illus.
A new method of vegetative propagation.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 3, bibl. 1.

A technique is described for producing rooted cacao cuttings in baskets in one operation at a substantial saving in cost as compared with the orthodox methods. The essential features are a glasshouse with a centrifugal humidifier maintaining 100% humidity and baskets with a central core of rooting medium surrounded by potting soil. The cutting is inserted into the core and the roots develop into the potting soil. [Author's summary.]

2119. WHITEHEAD, C.
Cacao propagation in Malaya with special reference to cacao nursery technique.
Malay. agric. J., 1954, **37**: 203-10, bibl. 11, illus.

The nursery technique for raising Amelonado cacao seedlings in Malaya is described. Topics include choice of nursery site, the use of wood veneer tubes as cheaper, alternative containers to the usual baskets, compost, seed selection and sowing, and management. The need to exclude about 75% of full sunlight and to protect the seedlings from rain has been demonstrated.

2120. ZAVALA GANGOTENA, C.
Desarrollo logrado en propagación de cacao asexual y planes de aumento futuro. **(Progress made in the vegetative propagation of cacao [in Ecuador] and plans for future expansion.)**
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 10.

The Empresa para Renovación de Cacao C.A. of Guayaquil, Ecuador, a company producing cacao planting material, operates 5 propagation centres and 2–3 more are projected. Their 55 selections include ICS clones and others from Ecuador and the Amazon zone. Trinidad and local-type propagators are used, the rooting medium being balsa sawdust. The average percentage rooting obtained in both 1952 and 1953 was 55. The company's output of rooted cuttings in 1953 was 240,000.

2121. MALINS-SMITH, R. K.
The pit method of rooting cacao.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 4, bibl. 1.

A pit 3 by 5 ft. was made 20 in. deep as a propagating unit to take advantage of the fact that the ground serves as a good insulator. A jute cover was used, and sawdust as the rooting medium. Watering was done three or four times daily to keep the cover constantly damp. The rooting was better in the pit-type propagator than in the conventional Trinidad unit. A larger pit 22 ft. in diameter was built with a rotary lawn sprinkler mounted 3 ft. above ground level. The sprinkler was operated 3 times daily for 20 to 25 mins during dry periods and 10 to 15 mins during wet periods. The sprinklers were also operated for brief periods during the day to keep the covers wet. No shade was used.

57% rooting was obtained. [Author's summary.]—Cacao prop. Stat., Hacienda Bolivar, Ecuador.

2122. Garcia R., F.
Ensayo comparativo entre pergamino de café y aserrin de madera como medios de enraizamiento para estacas de cacao. **(Comparison of coffee silverskin and sawdust as rooting media for cacao cuttings.)**
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 3, bibl. 3.

Coffee silverskin gave 66% and sawdust 52% strike in an experiment on rooting cacao cuttings at La Lola in 1954. While sawdust requires renewal every 6 months, silverskin can be used for 12–18 months.—Centr. interamer. Cacao, Costa Rica.

2123. Alvim, P. de T., and Duarte, O.
Mejores preparaciones hormonales para el enraizamiento de las estacas de cacao. **(The best growth-substance formulations for the rooting of cacao cuttings.)** [English summary ½ p.]
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 12, bibl. 6.

Indolebutyric acid, naphthaleneacetic acid and naphthaleneacetamide were compared for the rooting of cacao cuttings in sawdust in propagators in experiments completed in 1953. The best was 0·7 or 0·8% IBA in either 60% alcohol or talc. The addition of the fungicides Phygon XL or SR-406 in powder form to the talc formulation at the rate of 1:3 significantly increased the percentage of rooting. The commercial product Hormodin containing IBA as well as the mixtures of IBA and NAA recommended by others proved to be much inferior to straight IBA at 0·6–0·8%. The authors recommend as the best formulation the powder mixture, 3:1, of talc and Phygon XL or talc and SR-406 with 0·7 or 0·8% of IBA. The method of preparing this formulation is described. [From authors' summary. See also *H.A.*, 24: 4291.]

2124. O'Rourke, F. L. S.
The use of a plastic resin for transplanting cacao.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 5, bibl. 2.

The survival rates of cacao seedlings 10 days after planting out in the shade were 64–65% for plants dipped in a 10% suspension of Goodrite VL-600 vinyl resin latex and 56% in the controls. Similar figures for plants in the sun were 36–39% and 23%. Losses were so small in the shipment and transplanting of large lots of rooted cuttings that spraying with Goodrite is now standard practice at the Estación Experimental Tropical del Ecuador. [From author's summary.]

2125. Boynton, D., and Sands, F.
A survey of the fertility status of the cacao soils of Costa Rica, as determined by soil and leaf analyses, and a preliminary study of the relation of depth of rooting of cocoa trees to soil drainage.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 13.

Soil and leaf samples were taken in 1953 in representative cacao and coffee plantings in the major soil and climatic regions of Costa Rica. The analytical data are presented and discussed. *Soil samples.* In general the cacao soils were relatively high in exchange capacity, in base saturation and in soluble Zn and B. Widespread deficiencies, abnormally high levels or unbalances of the various nutrient elements appeared unlikely. In contrast many coffee soils showed low base saturation and either simple deficiencies or unbalances of several elements. *Leaf samples.* Interpretation of the data is complicated by the fact that samples were unavoidably taken over a period of several months from leaves of different phenological age. With increasing age of cacao leaves N, K and P decreased in concentration while Ca increased and Mg remained fairly constant. Mn and B trends were less consistent, but Mn appeared to increase and B to decrease with age in both cacao and coffee. Zn decreased with age. *Depth of rooting of cacao in relation to drainage.* Investigations at La Lola showed that the great majority of roots were in the top 2 ft. of soil regardless of tree vigour, that the more vigorous trees rooted more deeply, and that 2 soil conditions were associated with shallow rooting, namely (1) poor internal drainage, and (2) compacted gravelly clay or sboulder above 2 ft. which appeared to impede root penetration mechanically, if not as a result of poor aeration.

2126. Sands, F. B.
A study of the fertility status of the cocoa and coffee soils of Costa Rica.
Diss. Abstr., 1954, **14**: 1865, being *Publ.* 9925 of 213 pp.

A relatively high status of fertility was found in the coastal alluvial (cacao) soils. The nutritional status of coffee soils was found to vary. A cacao rooting study showed that the physical condition of the soil, rather than its nutritional status, appeared to be the limiting factor to production in many cases. Significant relationships were shown to exist in coffee between soil and leaf contents of Ca, Mg, and K. No relationships were found between soil and leaf contents of Mn, B, and Zn in either crop. A seasonal study on cacao and coffee leaves showed that the physiological age of the leaf had a pronounced effect on its mineral content. In cacao N, P and K concentrations per cent dry weight decreased with age, Ca increased with age, while Mg, Mn, B and Zn concentrations did not show consistent changes with age. As the coffee leaf matured N, K, B, Zn and P concentrations decreased, Ca and Mn increased, while Mg tended to remain constant.

2127. Murray, D. B.
A shade and fertiliser experiment with cacao. III.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 30-7, bibl. 3.

An analysis has been made of the yields up to date of an experiment in which the interactions of light intensity and fertilizer application are being investigated [see *H.A.*, 24: 866 and 1949]. Highly significant differences in yield have resulted from differences in light intensity, fertilizer application and clones and in some of their interactions. The effect of additional nitrogen increases markedly with increase in light intensity. A less marked effect is shown by additional potash. The hypothesis is advanced that the yield of young cacao is linearly related to the logarithm of light intensity but that this relation is conditioned by nutrient availability. When nutrient availability is low the linearity breaks down at a lower light intensity than when the nutrient supply is high. Increase in light intensity reduces the spread of the crop and delays the peak harvest. It has little effect on percentage cherelle wilt. The difficulties involved in a theoretical interpretation of the results are discussed and also the importance of the nutrition-light intensity interaction in the agronomy of the crop. On soils with low levels of available nutrients, permanent shade would appear essential to maintain the trees in a reasonable state of health. Yields, however, will be low. On more fertile soils, shade can be reduced, the condition of the trees will not suffer and yields will be higher. The use of shade on soils of high fertility should be not only unnecessary but would be deleterious to heavy cropping. [Author's summary.]

2128. Smith, G. W.
Some physical aspects of the cacao shade experiment.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 38-44, bibl. 3.

Records of soil temperatures and soil moisture contents have been taken in the Cacao Shade Experiment at the College Old Farm [see preceding abstract]. Shade has exerted a considerable effect on soil temperature at a depth of 3 inches. The range of temperature was much greater under 100% light conditions than under 15% light. It takes about three and a half years for the cacao to become sufficiently well developed under 100% light to reduce the temperatures to values similar to those under 15% light. Mulching tends to reduce soil temperature slightly and the range greatly. Soil moisture contents at the 0–6 inches depth are little affected by mulching, but tend to be lower under mulch at the 6–12 inches depth. A very significant correlation has been found between yields of cacao from ICS1 clones and depth below the surface of gravel lenses which occur in Block II. There is a significant correlation for ICS 60 and no correlation at all for ICS 95. [Author's summary.]

2129. Havord, G., Maliphant, G. K., and Cope, F. W.
Manurial and cultural experiments on cacao. Part III. River Estate and Central Experimental Station, Centeno, Trinidad.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 80-7, bibl. 4.

The results of two of the cultural and manurial experiments at River Estate [see *H.A.*, 24: 864 and 1948] for their first crop year are presented and discussed in detail. The main results were a considerable response to nitrogen and phosphate fertilizers and an increased yield from close spacing. Yield increases were accompanied by an increase in disease incidence, and by a smaller weight of cacao per pod. Shade had not yet had any effect. Mulches did not significantly affect yields or growth, and ICS 1 markedly outyielded ICS 8 and ICS 6, the latter clone being particularly poor in its first crop year. [Authors' summary.]

2130. Naundorf, G.
Aplicación de fertilizantes en forma de aspersiones foliares al cacao. (**Foliar nutrition of cacao.**)
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 3.

A summary is given of experiments at the Palmira Experiment Station and elsewhere in Colombia on the foliar nutrition of cacao with a mixture of urea, calcium glycerophosphate, potassium chloride and a commercial product "Vegetalin-Abono". The treatment reduced pod wilts and the percentage of withered beans, increased the yield of mature pods and the percentage of healthy beans and gave a slight but not significant reduction in *Monilia* pod rot.

2131. Machicado, M., and Alvim, P. de T.
Sintomatología de las deficiencias minerales en cacao. (**Mineral deficiency symptoms in cacao.**) [English summary 11 lines.]
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 10, bibl. 6.

Descriptions are given of the symptoms produced by deficiencies of N, P, K, Mg, Ca, S, Fe, Cu, Mn, B and Zn in young cacao plants grown in different nutrient solutions [see also *H.A.*, 25: 1010]. The Ca and Mg deficiency symytoms are said to differ from those described by Maskell, Evans and Murray [*H.A.*, 24: 868].

2132. Boynton, D., and Erickson, A.
A response of seedling cacao trees, under nursery conditions, to magnesium and calcium.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 10, bibl. 5.

An account is given of nutritional studies in 1953 on cacao seedlings growing in soil in which a previous planting had shown interveinal chlorosis and necrosis. Leaf analysis showed that Mg and Ca were low, K high and P intermediate. In 2 experiments 6 treatments were compared, namely nil, magnesium sulphate, magnesium sulphate plus lime, magnesium sulphate plus lime plus potassium sulphate, lime, and potassium sulphate. The results showed that (1) Ca was most important in fostering maximum stand and growth, (2) Mg was necessary to overcome interveinal chlorosis, and (3) under the existing conditions of low base saturation and high exchangeable K, K was detrimental to stand, growth and Mg absorption.—Interamer. Inst. agric. Sci., Turrialba, Costa Rica.

2133. Crowther, P. C., and Raymond, W. D.
The analysis of soil and foliage material in connection with sickle leaf disease of cacao in Ceylon.
Colon. Plant Anim. Prod., 1954, **4**: 257-9, bibl. 1.

Leaf samples from trees affected with sickle-leaf contained notably less Zn, somewhat less Cu and Ca and rather more Mn and Fe than did samples from healthy trees. Soil samples from beneath the healthy trees, however, showed generally higher plant nutrient levels than samples from beneath diseased trees, but no significant differences in Zn content. These results, while lending support to the view that sickle leaf is due to Zn deficiency [see *H.A.*, 21: 3980], cannot be regarded as conclusive.

2134. Fennah, R. G.
Nitrogen partition in the normal cacao leaf.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 45-52, bibl. 10.

The changes in proportion of dry leaf weight to fresh leaf weight, total nitrogen to dry leaf weight, and insoluble nitrogen, ammonia, glutamine, total amide and alpha-amino nitrogen to total nitrogen have been followed throughout the functional life of normal cacao leaves grown at different light intensities. Other treatments being equal, nitrogen partition in the leaf is not significantly different between leaves of equal physiological age when they are grown at different light intensities [15, 25, 50, 75 and 100%]. In leaves of equal temporal age total nitrogen, in relation to dry weight, is higher in shaded trees. For approximately the first 16 to 20 days after bud opening insoluble nitrogen forms a relatively larger part of the total nitrogen of unshaded leaves than of shaded; thereafter the difference changes in favour of the shaded trees. This relationship is reversed with reference to the relative amounts of the soluble nitrogen fractions with the exception of nitrate nitrogen. [Author's summary.]

2135. Gnanaratnam, J. K.
Pollination mechanism of the cacao flower.
Trop. Agriculturist, 1954, **110**: 98-104, bibl. 3.

Pollination studies at Kundasale gave the following results: (1) the period of stigma receptivity varied with variety; (2) pollen production ranged from plentiful to nil in different varieties; (3) pollen grains remained viable for 12 hours but thereafter viability declined rapidly; (4) pollen grains from a self-fertile and a self-sterile variety showed the same high percentage germination in agar medium; (5) in enclosed flowers no self-pollination occurred; (6) out of 19 selected trees only 5 were self-fertile; and (7) self-fertile trees were generally cross-compatible with self-sterile trees, but two cases of cross-incompatibility occurred in cross-pollinations between self-sterile trees. A description is also given of the flowers of a sterile cacao tree.

2136. Naundorf, G.
Contribución a la fisiología de la floración en cacao. (**Contribution to knowledge of the physiology of flowering in cacao.**)
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 2.

Some cacao trees in the Cauca valley, Colombia, never flower. In experiments designed to induce flowering in such trees bark patches from free flowering trees were grafted on the trunks and framework branches of some 10-year-old trees which had not flowered for 4 years. Six to eight months later the trees began to flower and fruit but the inflorescences on the grafted bark did not flower until after those on ungrafted tissue had flowered. Their flowering date was 3–4 weeks later than that of their mother trees.

2137. Alvim, P. de T.
Studies on the cause of cherelle wilt of cacao.
Turrialba, 1954, **4**: 72-8, bibl. 26, and [*Proc.*] *V Reunion Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 13, bibl. 26.

The cause of cacao cherelle wilt and the possibility of controlling it by para-chlorophenoxyacetic acid sprays were investigated at La Lola Experimental Farm, Costa Rica, in 1952/53. The data obtained indicated that higher incidences of cherelle wilt usually occur after periods of intensive growth of leaf flushes and/or when growth in trunk diameter decreased or was checked. Heavy rains checked growth in trunk diameter and caused severe incidence of cherelle wilt. The malady could be induced in terminal branches bearing young fruits by reducing the number of leaves to less than 6 to 9 per branch and by cutting a narrow ring below the fruit attachment. Spraying the fruits with para-chlorophenoxyacetic acid (20 and 50 p.p.m.) did not reduce the malady as reported from Colombia. Fruit setting was also not affected by this treatment. In the author's opinion cherelle wilt in Costa Rica appears to be caused by food strains in the plant brought about either by competition between growing leaf flushes and young fruits or by depression in the mechanism of food translocation. The high incidence of cherelle wilt following heavy rains is thought to be a consequence of poor soil aeration, which in turn interferes with growth and food translocation in the plant. [From author's summary.]

2138. Wellman, F. L., and Orellana, R. G.
"Buba" or cushion gall of cacao in Nicaragua.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 4, bibl. 5.

A description is given of the symptoms and effects of cushion gall, a disorder of unknown cause characterized by a hypertrophy of the flower cushions developing along branches and on trunks of old cacao trees.

2139. Orellana, R. G.
Contribution to the study of survival, dissemination and control of *Phytophthora* of cacao.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 10, bibl. 18.

It was found that surface-disinfected healthy shell pod pieces became infected when placed, for 4 or 5 days, epidermis down, in direct contact with sterile and non-sterile soils inoculated with *Phytophthora palmivora*; both soils remained infective for 101 days. Surface-disinfected, non-wounded, healthy pods inoculated with plantation soil from 0·1, 0·5 and 1·0 m. depth levels all developed *Phytophthora* infection after incubation in moist chambers, while the checks remained healthy. Infection was more severe on pods inoculated with soil from the shallowest depth. All surface-disinfected, non-wounded, healthy pods buried at depths of 0·1, 0·5 and 1·0 m. in a cacao shell dump pile developed *Phytophthora* rot after 1 to 4 days of burial. After the 8th and 12th days other common saprophytes and bacteria appeared, and in some cases no *Phytophthora* could be found. Except for the first day of burial, rotting was more severe close to the surface. Checks in moist chambers remained uninfected. When surface-disinfected, non-wounded, healthy pods were suspended in the air at different heights above the surface of a cacao shell dump pile infection was more severe close to the surface for the first 8 days. After the 12th day only slight differences in severity were observed at the different levels. Infection of the peduncles or upper part of the pods was seldom observed, in most cases the majority of the infected area occurring on the lower half. Rain must have washed wind-borne spores down to the lower halves of the pods, while pods just above the surface of the dump pile could have been inoculated by rain splash containing spores. Control of pod rot by sanitation and fungicides is briefly discussed. [From author's summary.]—Interamer. Cacao Cent., Turrialba.

2140. Siller, L. R.
Efecto de tres fungicidas en el combate del *Phytophthora palmivora* en arboles de cacao. **(Comparison of three fungicides for the control of *Phytophthora palmivora* on cacao trees.)**
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 10, bibl. 19.

Bordeaux mixture 4-4-50 applied at 30- and 60-day intervals and SR-406 and Dithane Z-78 at 30-day intervals were compared in an experiment at La Lola, Costa Rica, during 1951/54 for the control of *Phytophthora palmivora* on cacao. Bordeaux mixture and Dithane both applied at 30-day intervals were each significantly better than the other treatments and gave pod yields 40 and 39% better than the unsprayed control. [See also *H.A.*, 24: 4305.]

2141. Lellis, W. T.
A "podridão parda" dos frutos do cacaueiro na Bahia, e alguns trabalhos executados para o seu controle. **(Cacao black pod disease in Bahia, and some control experiments.)**
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 7.

An account is given of experiments made since 1943 on the control of *Phytophthora palmivora* on cacao. The removal or burial of fallen leaves and twigs was a useful preventive measure, but the best results were given by spraying with cuprosan (0·03% diseased pods), bordeaux mixture (0·3%) or perenox (9%) accompanied in each case by the above-mentioned preventive treatment.—Inst. Cacao, Bahia.

2142. Desrosiers, R., von Buchwald, A., and Bolaños, C. W.
Mass selection of cacao seedlings for resistance to witches' broom.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 11, bibl. 1.

Investigations have shown that statistically significant differences in susceptibility to *Marasmius perniciosus* exist between seedlings of the susceptible native Ecuador cacao population and those of the introduced Trinitario population. Mass selection of cacao seedlings for resistance to witches' broom disease by means of artificial inoculation of seedlings and subsequent roguing of the plants which develop symptoms of the disease, has been in progress at the Tropical Experiment Station of Ecuador since 1949. This has resulted in the establishment of a field planting of 698 selections. Monthly records are being kept on these trees with the object of selecting the best plants among them for clonal multiplication. [From authors' summary.]

2143. Holliday, P. C.
The susceptibility of some Imperial College selections to witches' broom disease.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 58-63, bibl. 6.

Three years' records at River Estate, Trinidad, show that ICS clones vary in susceptibility to witches' broom disease. Usually, though not invariably, those clones most susceptible to pod infection also produced most fan and cushion brooms. There were indications that manuring, while markedly increasing total yields, may also increase the percentage of pods lost through the disease.

2144. Holliday, P. C.
Spraying against witches' broom disease.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 64-6, bibl. 7.

In 2 experiments the application to the pods only of 1% or 2% bordeaux mixture repeated at monthly intervals from June or July to December, i.e. the period of highest infection of witches' broom, *Marasmius perniciosus*, produced a significant reduction in pod infection. There was some indication that 2% bordeaux may be slightly phytotoxic. In the same experiments Perenox (cuprous oxide) failed to give significant control. In a third experiment monthly applications from July to November of Blitox (copper oxychloride) and Perenox gave good control of witches' broom and black pod, *Phytophthora palmivora*. Sulfinette (lime-sulphur) gave some control of witches' broom but not of black pod. Fernide (tetra-methyl thiuram disulphide) and Ziram (zinc dimethyl dithiocarbamate) gave little or no control of either disease. Conditions under which a spray programme might prove economic are discussed.

2145. Laoh, J. P.
De bestrijding van *Acrocercops cramerella* in cacao. **(The control of *Acrocercops cramerella* in cacao.)** [English and Indonesian summaries ¼ p. each.]
Bergcultures, 1954, **23**: 671-6, bibl. 2.

Experiments were carried out on the control of the cacao pod-boring moth by chemicals to replace the normal method of stripping the trees of pods. DDT, BHC, dieldrin and dieldrex were disappointing in laboratory and field experiments, but endrin gave more promising results. A heavily infested area was sprayed with endrin at 300 c.c. in 200 l. water per ha., and satisfactory control was obtained. Control of *Helopeltis* was also obtained by this treatment. Two methods of control are possible, the one intensive with 16 applications per year and no stripping, the other extensive with 8 applications per year and stripping. Chemical control of the pest resulted in a much higher percentage of first quality cacao, and the cost of spraying was low in comparison to the gain in dry cacao. So far the chief pollinating insect *Forcipomyia* spp. has not been affected by the spray, but it is recommended not to spray during the main flowering time.

2146. van Willigen, B.
Enige gegevens over de bestrijding van cacaomot op de onderneming "Ngobo"-Ungaran. **(Some facts on cacao moth control on the "Ngobo" estate.)**
Bergcultures, 1954, **23**: 676-8.

The costs of spraying against cacao moth (*Acrocercops cramerella*) [see preceding abstract] are given. It is estimated that intensive endrin control cost Rp. 82 less per hectare than control by stripping plus *Helopeltis* control. The author warns that the chemical control schedule must be adhered to for its full effect, and thus in many cases less frequent spraying combined with stripping may be more acceptable.

2147. DE WITT, K. W.
A new solar fermentary.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 56-7, bibl. 1, illus.

The construction is described of a solar fermentary devised by McDonald [see *H.A.*, 6: 611] and since modified slightly. Individual fermentation boxes inside the fermentary hold 30–35 lb. wet cacao. Using a procedure, which is outlined, well-fermented cacao has been obtained consistently in over 30 trials involving 21 clones. In addition to testing sample batches the method might be of value to small producers.

2148. GRIMALDI, J.
Un procédé de fermentation du cacao au Cameroun. (**A method of fermenting cacao in the French Cameroons.**)
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 5.

The use of a slightly modified wine barrel as a container for fermenting cacao beans gave good, even fermentation. Details are given of the procedure.

2149. VAN DIJCK, J. I., AND OSTENDORF, F. W.
Het wassen van cacao. (**Washing cacao.**)
Surinaam. Landb., 1954, **2**: 239-52, bibl. 28, illus.

The advantages and disadvantages of washing cacao beans after fermentation are discussed. The authors recommend washing as part of the market preparation of cacao in Surinam, because the main harvest period coincides with the chief rainy season, when the drying of unwashed, fermented beans is sometimes difficult. Washing machines for large and small farms are described.

2150. BÄUCKER, A.
Chemische Untersuchungen an Kakaobohnen, die einer Hydrolyse unterzogen wurden. (**Chemical studies on hydrolysed cacao beans.**)
Fette Seif. Anstrichmitt., 1954, **56**: 815-18, from abstr. in *Trop. Abstr.*, 1954, **9**, No. b3184.

Treatment of cacao beans with moisture and heat results in certain changes of flavour. The process can be controlled by chemical analysis, and desirable characteristics can be obtained. The fermentation of raw cacao could be improved and rationalized as a result of these studies.

2151. FORSYTH, W. G. C.
The biochemistry of cacao: cacao "tannins".
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 6, bibl. 23.

Methods are described for the qualitative and quantitative analysis of most of the phenolic constituents of cacao cotyledons by paper chromatography.—Col. microbiol. Res. Inst., Trinidad.

2152. MARCHAND, P.
Les conditions du transport maritime des fèves de cacao. (**Shipping conditions for cacao beans.**) [English and Spanish summaries 7 and 8 lines.]
Agron. trop., 1954, **9**: 610-22, bibl. 62.

Recommendations for the treatment of cacao beans before shipment are: (1) maintain moisture content at less than 8%; (2) store in a clean, dry, well-ventilated store free from insects and contaminating smells; (3) do not expose to damp during transport. To minimize the risk of mould damage during the sea voyage: (1) stow the bags so as to allow free passage of air; (2) unload and re-dry any bag found mouldy on loading; (3) ventilate the hold thoroughly throughout the voyage except when the outside air is very humid; (4) if at the time of discharging the weather is cold and the cargo has become heated turn the ventilators to leeward and open the hatch gradually.

2153. RENAUD, R.
La qualité du cacao. Les moisissures des féves fermentées. (**Quality in cacao. The moulds of fermented beans.**)
Agron. trop., 1954, **9**: 563-82, bibl. 72.

The principal fungi causing moulds in fermented cacao beans are *Aspergillus glaucus*, *A. fumigatus*, *Mucor buntingii*, *A. flavus*, *A. tamarii* and *Penicillium* sp. The factors governing the development of moulds are discussed. *Condition of pods.* Pods infected with rot give a high percentage of mouldy beans. *Seedcoat.* Few fungi can penetrate an undamaged seedcoat. *Fermentation.* Fermented beans become mouldy more easily than unfermented ones because their seedcoats are more permeable; over-fermented beans are even more susceptible. *Drying and storage.* After fermentation mould development is governed by the moisture content of the beans and cannot take place if this is less than 8%.

2154. KALSHOVEN, L. G. E.
Twee soorten cacaomot in Nederland. (**Two species of cacao moth in the Netherlands.**) [English summary ½ p.]
Cacao, Choc. Suikerw., 1954, **22**: 265, reprinted as *Ber. trop. Prod. kon. Inst. Tropen* **246,** 1954, pp. 14, bibl. 16, illus.

Both cacao beans and the finished product may be attacked by larvae of *Ephestia cautella* and *E. elutella*. Preventive measures are more thorough fermentation and dry storage, with avoidance of breakage during shipment.

Cinchona

(*See also* 2260f, v.)

2155. RAO, M. M., AND VEERARAGHAVAN, R.
Vegetative propagation of cinchona, *Cinchona* sp.
S. Indian Hort., 1954, **2**: 71-84, bibl. 24, illus.

Following a review of the literature the authors describe work on the vegetative propagation of cinchona that has been carried out in Madras State over the past 10 years. Among the many methods tested those now used for large-scale multiplication of clones are patch and slit budding, cincturing, layering and mound-layering. These methods are described in detail with the aid of illustrations. Slit budding resembles shield budding, but without horizontal cut in the stock; the method is used on stocks that have become rather large for patch budding. In cincturing shoots are ringed just below a node, the ring is tied with a strand of hessian to prevent healing and the section of stem covered with moss and a dried banana sheath to etiolate it; root initials are produced in 40 to 60 days and the shoots are then cut off and planted.

Coconuts.

(*See also* 2260b, z, 2261a, 2286.)

2156. MARTYN, E. B.
The coconut disease in the Keta area of the Gold Coast (Cape St. Paul wilt).
Mimeo. Rep. Gold Coast Dep. Agric., 1954, pp. 24, bibl. 14, map.

The symptoms of Cape St. Paul wilt in the Gold Coast and of a similar disease in Nigeria appear to be identical to those of bronze leaf wilt in Trinidad and British Guiana, and it is suggested that this latter name be adopted for all these diseases. Investigations and observations at Keta failed to reveal any pathogen consistently associated with diseased palms and point to the cause being physiological. Among physiological factors no evidence was found to suggest that the trouble might be associated with deficiencies of major nutrients, the ground water table, soil structure, or toxic accumulations of chloride or other elements. It is therefore concluded that the most likely cause is a deficiency of one or more of the minor elements. The need for a comprehensive, long-term research scheme to study this and other problems of the coconut is stressed, and the Imperial College of Tropical Agriculture, Trinidad, is suggested as a suitable location for such a scheme.

2157. PANDALAI, K. M., SANKARASUBRAMONY, H., AND MENON, K. P. V.
Observations on the sudden wilting of coconut palms at Thottapally spillway area in Travancore-Cochin.
Indian Coconut J., 1954, **7**: 107-16, bibl. 17, illus.

The sudden wilting of healthy coconut palms at the bases of which dredged peaty subsoil had been dumped is described. It is considered to be due to desiccation and to root injury resulting from anaerobic conditions in the rhizosphere and the chemical composition of the dredged subsoil.

2158. NAGARAJ, A. N., DAVIS, T. A., AND MENON, K. P. V.
Sap transfusion, a new device for virus transmission trials in palms.
Indian Coconut J., 1954, **7**: 91-8, bibl. 24, illus.

The symptoms of the coconut wilt or root disease in India suggest that it is of virus origin. As graft transmission is impracticable 3 other methods of virus transmission have been developed. In a sap transfusion method used for adjacent healthy and diseased trees roots from the 2 trees are cut and the tip end of one from the diseased tree is joined to the upper end of one from the healthy tree by means of a sealed rubber tube filled initially with distilled water. Alternatively infective extracts are transfused into healthy trees either through the tips of roots induced to form on the stem by the application of an earth-filled box or through the cut ends of mature normal roots.—Centr. Coconut Res. Stat., Kayangulam.

2159. RADHA, K., AND MENON, K. P. V.
Studies on the wilt (root) disease of the coconut palm. A comparative study of the rhizosphere microflora of coconut from diseased and healthy areas.
Indian Coconut J., 1954, **7**: 99-106, bibl. 13.

In an investigation of the rhizosphere of coconut palms root and soil samples were taken at 1, 2, 4 and 6 ft. depths from pits 3 to 5 ft. away from trees growing in sandy and in lateritic soils in healthy and root-diseased areas. The results were: (1) incidence of microflora was significantly greater in the rhizosphere than in control soil; (2) incidence of microflora became less with depth in lateritic soil but was not correlated with depth in sandy soil; (3) incidence of microflora was less in diseased than in healthy areas in sandy soil, and was least in the advanced stage of the disease; (4) the incidence of fungi was consistently greatest, of bacteria intermediate, and of actinomycetes least. Of the 3 soil fungi hitherto associated with the disease, *Botryodiplodia theobromae* was present in quantity in healthy palms, *Rhizoctonia bataticola* was found in both healthy and diseased areas but was less common in healthy samples, and *Rhizoctonia solani* was isolated only from diseased samples.—Centr. Coconut Res. Stat., Kayangulam.

2160. HARMAN, L.
Small copra driers at Rabi.
Agric. J. Dep. Agric. Fiji, 1954, **25**: 7.

Small driers with a capacity of 1–4 sacks are becoming popular in Fiji. Notes are given on their construction using 44-gallon drums, corrugated iron and other readily available materials and on their method of operation.

Coffee.

(*See also* 2126, 2260f, m, s, 2261p, t, 2309, 2312.)

2161. TANGANYIKA (SANDERS, F. R.).
Twentieth Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi, 1953/54, 1954, pp. 43, Shs. 2/-.

Improvement of plant material. In the clonal selection trials selections of the Kents strain have shown a higher yielding capacity than those of the Bourbon variety. In one of the 2 long-standing experiments in which the yields of clones and seedlings of the same parent are being compared the seedlings are outyielding the clones and in the other there is no significant difference between them. In liquoring tests Bourbon progenies have shown the most consistent high quality. With the exception of one high-altitude plot, clones have retained their quality under differing soil and climatic conditions. *Improvement of growing conditions.* In the mulch/compost/nitrogen trial planted in 1940 only compost has given a significant yield increase over the whole period. In the pruning method experiment the difference between the yields under the single-stem and multiple-stem (3 suckers) systems is 26% in favour of the latter over the 16-year period. The data show that the real advantage of the multiple system lies in its ability to give heavier crops at an early age. In the experiment on the time of pruning single-stem coffee, results for the first 5 years show that early pruning (in the month of harvesting) increases yields compared with later pruning. The first yields are recorded of an experiment in which 2 methods of establishing the single-stem system are being compared with 3 methods of establishing the multiple-stem system. Investigations show that the factors involved in early and heavy cropping in young coffee are (1) the production of suckers at a time favourable to their growth and development and (2) early capping, which avoids wasting the reserves of the tree in extending the main stem unnecessarily; conditions necessary to obtain this are (1) uninterrupted growth and development during the first 15 months in the field and (2) the trees should be ready for capping in March of the year following planting, i.e. after 11 months. Trials are also reported on the control of *Digitaria scalarum* with TCA and on artificial drying.

2162. Laíns e Silva, H. J.
Subsídios para o fomento da cultura do café em Moçambique. (**Subsidies for the stimulation of coffee growing in Mozambique.**) [English and French summaries $2\frac{1}{4}$ pp. each.]
[*Publ.*]*Agênc. ger. Ultramar Portug.*, 1954, pp. 148, bibl. 109, illus.

Coffee grows wild in all parts of Mozambique, the indigenous species being *Coffea zanguebariae*, *C. racemosa*, *C. ligustroides* and *C. salvatrix*. The results are presented of an ecological study of Inhambane (*C. racemosa*), the best-known local type, which grows in the coastal area under climatic conditions (683–1,113 mm. and a long dry season) which are said to differ from those in coffee-growing areas in other parts of the world. Information is given on flavour, bean weight and caffeine content in the Inhambane and Ibo types, which are considered to offer commercial possibilities, and on the choice of localities for the commercial development of arabica. No direct reference is made to the subsidies mentioned in the title.

2163. Godoy, C.
Germinadores de areia para café. (**Sand germinators for coffee.**)
Rev. Agric. Piracicaba, 1954, **29**: 291-6, bibl. 6, illus.

An account is given of a successful experiment with a sand germinator for raising coffee seedlings at the Luiz de Queiroz Agricultural School, São Paulo, Brazil. Seed was sown at the rate of 2,200–2,400 g. (about 12,000 seeds) per sq. m. on a bed of river sand in boxes, covered with 2 cm. sand, kept in the shade at 23–30° C., and given a copious daily watering. The seedlings were ready for removal in 60–90 days depending on the size required. The date of sowing can be fixed in relation to the best season for planting out coffee seedlings at the cotyledon stage, namely the rainy period of December/February. The germination rate in the sand boxes is not stated but the method is considered to have a number of advantages.

2164. Evans, H. R.
Root grafting of coffee seedlings.
Trop. Agriculture, Trin., 1955, **32**: 66-71, bibl. 2, illus.

A seedling root grafting technique for coffee is described which has given 100% take within a month. Most of the trials were carried out with *C. arabica* varieties on *C. arabica* rootstocks, but in 2 small tests *C. excelsa* on *C. arabica* and *C. arabica* on *C. liberica* were used. Seedlings of 12–24 months old were used as rootstocks, the roots being severed at points at which they matched the scions in diameter. Soft or semi-ripe terminal shoots cut from vertical growths were used as scions. These were cleft grafted, the wedge on the scion being cut through the second or third node below the first set of mature leaves. Except in the case of *C. excelsa*, foliage did not require reduction but all axillary growths were removed. Planting was carried out in closed glass-covered propagators shaded with hessian. The compost consisted of a 1: 1 mixture of decomposed coffee hullings and sand, and the graft union was buried just below the surface. Deeper planting tended to induce scion rooting. Grafts were mist-sprayed daily to maintain humidity. Union was complete within a month but the grafts were kept in the frame for a further 2 months until both root and scion were making growth. On removal from the frame the grafts were potted up and hardened off gradually. They were ready for planting out $4\frac{1}{2}$ months after grafting. Planting the grafts directly in an open shaded bed instead of in the propagating frame resulted in complete failure. Possible improvements on the technique are discussed. It is considered that this technique should prove of special value for investigating the influence of rootstocks and for transmission work.—Agric. Dep., Kenya.

2165. Robinson, J. B. D., and Cottington, E.
A simple method of determining soil depth in coffee soils.
Mon. Bull. Coffee Bd Kenya, 1955, **20**: 14-15.

With a soil probe consisting of a pointed 10-foot length of 1-inch diameter, tempered steel rod it is possible on lateritic red loam coffee soils (Kikuyu red loam series) to distinguish quite easily between (*a*) soil containing rounded, pellet murram particles (pisolitic murram), (*b*) layers of pisolitic murram which occur in the subsoil, and through which the probe penetrates quite readily, and (*c*) hard, layered murram (massive murram) or rock. When the price of coffee falls areas of mature coffee with shallow and/or murram profiles could economically be withdrawn from production and profitably replaced by elephant grass for mulch production. It is considered that 6–7 ft. is the minimum depth of murram-free soil for satisfactory production in this climatic zone.

2166. Ferraz de Assis, A. F.
Banquetas individuais e plantio de cafeeiros em terrenos de encosta. (**Individual terraces for planting coffee on slopes.**)
Rev. Agric. Piracicaba, 1954, **29**: 297-302, bibl. 3, illus.

A description is given of a method of contour planting on individual terraces successfully used in the formation of a coffee plantation on a 34% slope at the Luiz de Queiroz Agricultural School, São Paulo, Brazil. The terraces were 2 m. in diameter and were given a 15% reverse slope. Natural vegetation was established on them.

2167. Pereira, H. C., and Jones, P. A.
A tillage study in Kenya coffee. Part I. The effects of tillage practices on coffee yields.
Emp. J. exp. Agric., 1954, **22**: 231-40, bibl. 8, illus.

The results are presented for the first 5 years of a tillage experiment on arabica coffee involving 3 types of implement (forked hand hoe, tractor-mounted disc harrows and tractor-mounted 3-furrow plough), 3 depths of cultivation down to 6 inches, 3 sub-soiling treatments and 3 weed control policies, namely, (*a*) clean cultivation, (*b*) weeds slashed during the two rainy seasons each year and cultivated at the onset of dry weather, and (*c*) unrestricted weed growth during the rains killed by cultivation only at the onset of dry weather. Weed growth seriously reduced coffee yields in each year, the reductions for 5 years being 39% for unrestricted weed growth and 27% when weeds were slashed. The highest yields were produced consistently by clean weeding with the forked hoe. Averaged over all weed conditions, disc harrowing gave yields significantly lower than either hoeing or ploughing. Neither depths of tillage nor sub-soiling produced significant yield differences. Cattle manure applied to sub-plots to encourage different levels of weed growth did not increase coffee yields. Tillage treatments had no significant effects on the quality of the crop.—Coffee Res. Stat., Ruiru.

2168. Coffee Research Station, Kenya.
Irrigation of coffee: a review of current practice.
Mon. Bull. Coffee Bd Kenya, 1954, **19**: 277-8, bibl. 9.

Notes are given on surface water *vs.* borehole supply; furrows *vs.* pipes for delivery; surface flooding *vs.* furrow irrigation *vs.* portable pipes *vs.* overhead irrigation; time, frequency and rate of irrigation; effects on growth of the coffee tree and on flowering, cropping and pests and diseases; effects on physical and chemical properties of the soil. Proposals for further investigations are outlined.

2169. Thirion, F.
Quelques principes de la taille du caféier Robusta. **(Some principles of robusta coffee pruning.)**
Bull. Inf. INEAC, 1954, **3**: 295-315, bibl. 13, illus.

Aspects discussed include the development of buds, trunk and branches in robusta coffee, root and branch pruning on planting out, training by the single and multiple stem methods, and renewal and rejuvenation pruning.

2170. Wellman, F. L.
Fungi isolated most frequently from dying coffee fruit branches.
From abstr. in *Phytopathology*, 1954, **44**: 509.

In Costa Rica a serious dieback results from unseasonable leaf fall in coffee. An investigation of the causative fungi was made. The most vigorous trees showed least leaf fall. Less disease occurred in trees in moderate shade than in full sun, and less in well-weeded plantings than in severely grass-infested plots. Sprays of inorganic and organic fungicides increased leaf retention and greatly reduced dieback of lateral branches.

2171. Wellman, F. L.
The *Fusarium* phase of the root-disease complex in coffee.
From abstr. in *Phytopathology*, 1954, **44**: 509.

Fusarium oxysporum f. *coffeae* was found to be the most important invader of diseased arabica coffee seedling roots. Detailed search demonstrated this *Fusarium* to be of primary occurrence in cases where appearances suggested that other fungus pathogens were solely responsible. *Coffea dewevrei* is apparently resistant to *Fusarium*. Control of root rots is being sought by use of *C. dewevrei* roots grafted with arabica tops.

2172. Vasconcellos, F. T. C., Leiderman, L., and Sauer, H. F. G.
Estudo da ação de vários inseticidas orgânicos sôbre o "bicho mineiro" do café no interior das minas. **(A study of the effect of certain organic insecticides on coffee leaf-miner caterpillars in their tunnels.)**
Biológico, 1954, **20**: 165-9, bibl. 5.

Thirteen chlorinated hydrocarbon and phosphoric ester insecticides as emulsifiable concentrates or as wettable powders were compared for the control of *Perileucoptera coffeella* caterpillars in their tunnels at Campinas, Brazil, in 1954. With the exception of parathion which gave 100% control, the wettable powders were not so effective as the emulsions. In the latter form 4 phosphorous insecticides, metacide, systox, malathion and parathion, gave 88–93% control. Among 9 chlorinated compounds used as emulsifiable concentrates, dieldrin, endrin, isodrin, chlordane, DDT and lindane all gave 91–97% control.

Guavas.

(*See also* 2260j, 2261m.)

2173. Ullah, M. H.
Cultivation of guava (*Psydium juajava*) in the Punjab (Pak.).
Punjab Fruit J., 1953, **17** (62/63): 15-20, bibl. 3.

Since the creation of Pakistan, guavas have been increasingly planted until the country is now almost self-supporting. Climatic, soil and cultural requirements are given, and the average yearly income per acre is estimated at Rs. 3,000.

2174. Tandon, R. N., and Agarwala, R. K.
Pathological studies of *Gloeosporium psidii* causing die-back of guavas.
Proc. Indian Acad. Sci. Sect. B, 1954, **40**: 102-9, bibl. 9, illus.

Information is given on the occurrence, symptoms and extent of damage at Allahabad. Bordeaux mixture, 3: 3: 50, and 0·22% and 0·33% perenox gave encouraging results in control experiments.

Mangoes.

2175. Subra, P.
Greffage du manguier au Cameroun. **(Mango grafting in the [French] Cameroons.)**
Fruits d'Outre Mer, 1954, **9**: 498-501, illus.

Experiments on mango grafting began at the IFAC station at Nyombe in the French Cameroons in 1952. Seedlings from village trees are used as rootstocks. Scion varieties from Egypt, the West Indies and elsewhere are being tested. Details are given of the types of graft used or under trial, namely veneer, side whip, side graft under bark and into the wood, and chip budding. Veneer grafting, the most widely used method, has given an average take of 61%.

2176. SINGH, R. N.
Studies in floral biology and subsequent development of fruits in the mango (*Mangifera indica* L.) varieties Dasheri and Langra.
Indian J. Hort., 1954, **11**: 69-88, bibl. 20, illus.

No examples of parthenocarpy were found in these two varieties. Cross pollination is chiefly effected by 3 types of fly. In these studies 41% of the flowers were pollinated within about 48 hours of opening, while the rest remained unpollinated. No self-fertility was shown in these varieties. Langra had a higher percentage of perfect flowers than Dasheri, but the percentage of fully developed fruits retained on Dasheri was slightly more than on Langra. Dissection of fruits which dropped in early stages showed ovule and embryo disintegration in many cases.

2177. SIDDAPPA, G. S., AND BHATIA, B. S.
Tender green mangoes as a source of vitamin C.
Indian J. Hort., 1954, **11**: 104-11, bibl. 2.

Green mangoes, which are rich in true ascorbic acid, were dried as slices after being steeped in dilute sulphite solution. The retention of ascorbic acid in the slices after 6 months storage at 24–30° C. was about 75%, and after 12 months storage was 45%.

2178. SHAW, J. G., AND LOPEZ D., F.
Ethylene dibromide as a fumigant for mangoes infested with the Mexican fruit fly.
J. econ. Ent., 1954, **47**: 891-3, bibl. 10.

In large-scale tests in Mexico City 99·99% mortality of the eggs and larvae of Mexican fruit fly, *Anastrepha ludens*, in mangoes was obtained by fumigation with 12 oz. of ethylene dibromide per 1,000 cu. ft. at 77° F. The treatment applied at 16 to 24 oz. rates did not affect the flavour, appearance or ascorbic acid content of Manila mangoes.

Oil palms.

(*See also* 2300.)

2179. ZILLER, R., PRAQUIN, J., AND BRUNEL, J.
Influence du milieu sur certains caractères et la production de l'*Elaeis*. **(Effect of environment on certain characters and on the yield of oil palms.)**
Oléagineux, 1955, **10**: 9-14, bibl. 1, illus.

Studies were made on oil palms of the same genetical origin growing under different conditions of climate and soil at Pobé in Dahomey (rainfall 1,170 mm., rainy season 106 days, mean annual temperature 27·7° C., mean annual relative humidity 78·3%) and at La Mé in the Ivory Coast (1,873 mm., 136 days, 28·5° C. and 83%). At La Mé the height and diameter of the stipe and the number of leaves were considerably greater, the weight of nut bunches was 3·0–4·0 times greater and the oil yield was 2·5–2·9 times greater. The chief causes of these differences are rainfall and soil. At Pobé mineral fertilization gave a considerable increase in yield.

2180. PREVOT, P., AND DUCHESNE, J.
Densités de plantation pour le palmier à huile. **(Planting densities for the oil palm.)**
Oléagineux, 1955, **10**: 117-22, bibl. 2.

In an oil palm spacing trial planted at La Mé, Ivory Coast, in 1926 and harvested from 1932 to 1947 the spacings used were 8×8 to 10×10 m. (100 to 156 trees per ha.) in square planting and 8×8×8 and 10×10×10 m. (117 and 176 per ha.) in triangular planting. A linear relationship was found to exist between density and yield per tree. It was calculated that the spacings which would give the maximum yields were 145 trees per ha. in square planting and 130 in triangular planting. At equal densities triangular spacing gave distinctly higher yields than square spacing.

2181. FERWERDA, J. D.
Replanting of oil palms.
Trop. Agriculture, Trin., 1955, **32**: 45-57, bibl. 3.

An experiment was carried out to determine whether there was any advantage in felling the old stands or fertilizing the soil before replanting a new oil palm plantation on an old site. It was shown that the economic benefits of temporarily retaining the old stand are greatly offset by the increased mortality and retarded development of the young palms. Whether the old stand should be partly or completely retained in any particular case will depend on its production, the period of retention and the expected production of the young palms. Growth measurement showed that the benefits of fertilizing are limited so long as the old stand is completely retained but are very great if the old stand is felled prior to planting. The results obtained so far do not allow an evaluation of the effect of felling and fertilizing on the future production of the young plants, but it seems probable that, on poor soil, both practices will increase productivity.—Res. Dep., Huilever S.A., Yaligimba-lez-Bumba, Belgian Congo.

2182. SCHEIDECKER, D.
Teneur en glucides et nutrition minérale chez le palmier à huile. **(Soluble carbohydrate content and mineral nutrition in the oil palm.)**
Oléagineux, 1954, **9**: 847-52, bibl. 4.

Investigations on the total soluble carbohydrate content of leaves of oil palms of different ages and productive capacities at different seasons and times of day led to the following conclusions: (1) sterile pisiferas differ from palms of high and low productivity, not only in their habit and in the greater development of their vegetative parts, but also in their leaf content of mineral elements and carbohydrates; (2) the leaf content of total soluble carbohydrates was virtually constant from 6 to 27 years old in the palms examined; (3) K is evidently linked with carbohydrate metabolism, but other factors are also involved at certain seasons, since the soluble carbohydrates and K contents do not maintain the same relationship to one another throughout the year; when the leaves are richest in N, P, K and Mg, they are poorest in sugars.—I.R.H.O., Pobé, Dahomey.

2183. KOVACHICH, W. G.
***Cercospora elaeidis* leaf spot of the oil palm.**
Trans. Brit. mycol. Soc., 1954, **37**: 209-12, bibl. 2, illus.

Cercospora leaf spot, a disease of young oil palms, is described. An inoculation experiment proved that the disease is caused by *Cercospora elaeidis* Steyaert. It was shown that the lower leaf surface is more easily penetrated by the fungus than the upper. Control measures recommended include the removal and destruction of all dead or nearly dead leaves, the prevention of overcrowding in the nursery, and spraying with a fungicide. Sprays should be applied during the 2 months before and after transplanting and also during periods of increased humidity. Special care should be taken to cover the under surfaces of the leaves. Preliminary trials indicated that bordeaux mixture 4-4-40 was a suitable fungicide. The substitution of hydrated lime for quicklime in the mixture is recommended.—Res. Dep., Huilever S.A., Leopoldville, Belgian Congo.

Papaws.

2184. Murakishi, H., Aragaki, M., and Kamasaki, H.
Etiology and control of black spot of papaya in Hawaii.
From abstr. in *Phytopathology*, 1954, **44**: 499.

A serious outbreak of fruit and leaf spot of papaw occurred during the winter and spring of 1952/53. The pathogen was *Cercospora papayae* which has not previously been reported as causing fruit spots. Zineb, ziram, manzate and captan gave very good control.

Pineapples.

(*See also* 1885, 2309.)

2185. Py, C.
Les différents types de rejets d'ananas. **(Different types of pineapple shoots.)**
Fruits d'Outre Mer, 1955, **10**: 25-42, bibl. 10, illus.

The respective values of different types of pineapple shoot as planting material are discussed. Plants of Baronne de Rothschild grown from different shoot types were compared under non-irrigated conditions in French Guinea. Six types were used, namely crowns, slips, suckers of 3 lengths (40–50 cm., 30–40 cm. and 20–30 cm.), and discs. The plants were divided into 3 groups, one group being treated with acetylene in August to fruit in February, a second being treated in October-November to fruit in April-May and the third being left untreated. There were 3 natural flowering periods, in mid-November, in mid-January and the strongest at the end of February. By the end of the season plants from long suckers had given the highest percentage of flowering, including an important amount of premature flowering in November. Other suckers and slips gave about 80% flowering mostly at the end of March. Disc plants gave about 70% flowering and crowns 30%. In the acetylene-treated groups plants from long suckers had the highest average plant height and the largest average fruit stem diameter at both harvests, though there was no significant difference at the first harvest between them and plants from medium suckers. Plants from crowns and discs were the smallest in height and diameter at both harvests. There was no significant difference in weight of the heaviest fruit of plants from long and medium suckers at both harvests. Crown shoot plants gave the lowest average fruit weight at both harvests, but there was no significant difference between crown and disc plants at the second harvest. Crown and disc plants produced fewer vegetative shoots than slips and small suckers. In all cases suckers formed a majority of the shoots produced. Plants from long and medium suckers produced a greater total number of shoots and a higher percentage of slips than the others. The author concludes with some practical advice on the preparation of planting material.

2186. de Hernández, A. R.
Relationship between chromosome number and stomata size in certain pineapple varieties.
J. Agric. Univ. Puerto Rico, 1954, **38**: 199-204, bibl. 10, illus.

The stomata of a triploid variety were significantly larger than those of 10 diploid varieties.

2187. Sideris, C. P., and Young, H. Y.
Effects of chlorides on the metabolism of pineapple plants.
Amer. J. Bot., 1954, **41**: 847-54, bibl. 16.

Studies were made on the growth, fruiting and metabolism of pineapple plants grown in nutrient solutions with variable concentrations of chlorides, N, K and Ca. In cultures containing 280 mg. chloride per litre nutrient solution deficiency of N or K resulted in very great reductions in plant weight and relatively high concentrations of chloride in the plant tissue, compared with cultures in which N and K were supplied in adequate concentrations. Terminal leaf necrosis was severe only in the K-deficient cultures. It is concluded that this leaf injury, commonly occurring in plants exposed to sea water sprays, results from chlorides in association with K deficiency, and that K increases the tolerance of tissues to chloride toxicity by increasing the tissue concentration of polysaccharides. In the culture containing adequate K and N the growth rate was higher than in the K-deficient culture, intake of K, Ca and Mg was greater, intake of nitrates, phosphates and chlorides was lower, and accumulations of sucrose and starch were greater. Fruit weights were lower in cultures with high chloride concentrations than in those with low, and in cultures with ammonium-N than in those with nitrate-N.—Pineapple Res. Inst., Honolulu, Hawaii.

2188. Malaya Department of Agriculture.
Notes on current investigations, agronomy July to September, 1954. Pineapples.
Malay. agric. J., 1954, **37**: 235.

Pineapples can be sprayed with very concentrated nutrient solutions made up from urea, mono-ammonium phosphate and potassium nitrate. Evening applications with a high-volume knapsack sprayer have had no harmful effect using 40% solutions but midday applications have been followed by some leaf scorch. Changes in leaf colour occurred within 5 days of application. When potassium chloride was substituted for potassium nitrate scorch resulted from considerably lower concentrations.

2189. COLLINS, J. L., AND CARTER, W.
Wilt resistant mutations in the Cayenne variety of pineapple.
Phytopathology, 1954, **44**: 662-6, bibl. 8, illus.

Three clones of Cayenne pineapple, Nos. 573, 666 and 1069, have shown some resistance to the disease caused by the mealybug *Pseudococcus brevipes*. The degree of resistance is variable among the 3 clones and within each clone, this variability being affected by at least two factors, namely mealybug source and repeated infestations with large colonies of mealybugs. When resistant plants show wilt symptoms these are often very mild. Resistance is transmitted to progeny raised from seed. The resistance character is believed to have originated through somatic mutations in the vegetatively propagated parent variety.—Pineapple Res. Inst., Hawaii.

Rubber trees.

(*See also* 2260a, c, e, f, o, 2261k, w, x.)

2190. MANN, C. E. T.
Investigation of the rubber industry in Papua and New Guinea. I and II.
Papua New Guinea agric. Gaz., 1953, **8** (2): 40-56; and 1954, **8** (3): 28-47.

This report includes information on the acreage of rubber in Papua, production and production costs, a survey of plantations, planting material, tapping and harvesting, pests and diseases, processing, the principal planting districts of Papua, rubber in New Guinea, expansion of the industry in Papua-New Guinea, and notes on soils, planting material, diseases and cultural techniques,

2191. RUBBER RESEARCH INSTITUTE OF CEYLON.
Report of the Work of the Rubber Research Board in 1953, Colombo, 1954, pp. 116.

Work reported from the Institute includes: *Chemistry:* Approximate determination of the d.r.c. of fresh latex, prevention of precoagulation. *Botany:* Breeding and selection, clonal, clonal seedling and budded rubber trials, bud grafting, crown budding, hedge planting, rainguards. *Mycology:* Oidium control, dusting and spraying machinery. *Agronomy:* Foliar analysis in manurial experiments, control of *Oecophylla smaragdina* with chlordane, investigation of possible soil acidification due to sulphur dusting.

2192. RUBBER RESEARCH INSTITUTE OF MALAYA.
RRIM "600" series—further observations.
Plant. Bull. R.R.I.M., 1955, No. 16, pp. 3-9, illus.

Information is given on the habit, girth, wintering and yield of clones RRIM 600 to 630. [For earlier information see *H.A.*, 23: 4631 and 25: 1058.]

2193. PAARDEKOOPER, E. C.
Resultaten van twee onderstamproeven bij hevea. (**The results of two rootstock experiments with rubber.**) [English and Indonesian summaries ½ p. each.]
Bergcultures, 1954, **23**: 551-6.

In a trial at Peweja, PR 107 and Pilm B 58 scions were budded to the seedling rootstocks of AV 163, Tjir 1, PR 107, BD 5 and *Hevea confusa*. The influence of stock on scion growth was marked in the early years of growth, but no differences were apparent at 10 years, except for slower growth of PR 107 on *H. confusa*. The effect of stock on scion yield was most marked in cuts near the union. Over 5 tapping years PR 107 yielded more on AV 163 and Tjir 1 than on PR 107 or BD 5. There were no differences between yields of Pilm B 58 on the 4 *brasiliensis* stocks. Production by both clones was less on *H. confusa*. It is concluded that the rootstocks AV 163 and Tjir 1 were the most satisfactory. A second trial, started at Parung Pandjang in 1943, was seriously damaged during the war. It showed, however, that seedling stocks of *H. spruceana* had unfavourable effects on yield and growth of the clones LCB 1320, WR 101, GT 1, PR 107, and PR 210.

2194. WESTENBERG, M. G.
Unieke uitdunning op stamomvang in monoclonale oculatietuinen. (**Single thinning based on girth measurement in monoclonal budded plantations.**) [English summary ¾ p.]
Bergcultures, 1954, **23**: 621-31, 655-67, 679-97.

The problem of thinning monoclonal budded rubber plantations by a single thinning of 25% is discussed. A theoretical solution of the problem appears possible, as there is random variation in plant growth owing to individual growing capacity of the stocks. The following conclusions, which are statistically substantiated, are drawn: Selective thinning alone would probably give uneven distribution of growing space for the remaining trees, particularly if done by girth measurement. Systematic thinning alone gives ideal space distribution, but in practice does not allow for qualitative improvement. The most promising method appears to be by selective thinning of a minimum thinning plot, such as a tetrad, on the basis of girth measurement. This method has the advantage of being unaffected by local differences in fertility, and so selection of the growing capacity of stocks is possible. It is estimated that 68·4% of the thinnings will be poor growers and 31·6% will be good growers. Each tree will be exposed on at least one side while the chance of a quadruple exposure will be 16: 1.

2195. ALLEN, E. F.
Cultivating other crops with rubber.
Plant. Bull. R.R.I.M., 1955, No. 16, pp. 10-21, illus.

This paper is concerned with crops which are suitable for inter-planting with hedgerow-planted rubber and which do not require large amounts of bulky organic manures, namely liberian and robusta coffee, cacao, manila hemp, bananas, pineapples, derris, gambier, tea, oil palms, kapok, fruit trees (rambutan, lime, grapefruit, durian and mangosteen), sisal, *Furcraea gigantea*, patchouli, legume leys (*Centrosema pubescens*), balsa and *Gmelina arborea*. Information is given on culture, spacing, manuring, shading and soils.

2196. BOLLE-JONES, E. W., AND RATNASINGAM, K.
Nutrition of *Hevea brasiliensis*. IV. Interclonal and seasonal variation in composition of leaves.
J. Rubb. Res. Inst. Malaya, 1954, **14**: 257-75 plus figs 11 pp., bibl. 12, being *Commun.* **292.**

Leaves were sampled at intervals, over a period of a year, from clones Tjir 1, PB 86 and RRIM 501 and analysed. The petiolar rubber concentration and the laminar concentrations of chlorophyll, ash, nitrogen, phosphorus, magnesium, potassium, calcium and iron varied according to clone. Increasing age of leaf increased the petiolar concentration of rubber and the laminar concentrations of chlorophyll, ash, calcium, iron and manganese but decreased the laminar concentrations of nitrogen, phosphorus and potassium. The month of sampling affected markedly the concentration of each variable examined and significantly influenced the effect of whorl position (or age of leaf) on the concentrations of rubber, chlorophyll, phosphorus and calcium found. The effect of month of sampling on the laminar chlorophyll and calcium concentrations also varied with clone. Rainfall was partly responsible for the seasonal variation encountered in the rubber, nitrogen and iron concentrations. The petiolar rubber concentration varied according to the laminar nitrogen concentration, which, in turn, was influenced by the calcium concentration present. [Authors' abstract.]

2197. HAINES, W. B., CROWTHER, E. M., AND THORNTON, G. J.
Manuring hevea V: some long-term effects in the Dunlop (Malaya) experiments.
Emp. J. exp. Agric., 1954, **22**: 203-10, bibl. 6.

Extensive manurial trials were started on the Dunlop rubber estates between 1930 and 1934 and progress on them up to the time of the Japanese occupation was reported in earlier papers [see *H.A.*, 17: 1732 and earlier]. The present paper records such post-war measurements of growth and yield as are available as an indication of residual effects. The effect of P on girth and yield has been particularly marked in most cases and in some cases there have been significant positive interactions between N and P. There is evidence from one trial that replacing a *Centrosema* cover crop by clean cultivation was of immediate benefit to the trees and temporarily had a larger effect than manuring with P. The records also indicate that the roots of mature trees can spread for at least 80 ft., resulting in extensive poaching of fertilizers despite the presence of guard rows.

2198. BOLLE-JONES, E. W.
Nutrition of *Hevea brasiliensis*. III. The interrelationships of magnesium, potassium and phosphorus.
J. Rubb. Res. Inst. Malaya, 1954, **14**: 231-56, bibl. 28, illus., being *Commun.* **291.**

Seedlings of *Hevea brasiliensis*, clone Tjirandji 1, were grown in pot sand culture at varying levels of magnesium, potassium and phosphate supply. A close interrelationship between these three nutrients was demonstrated which affected the growth and composition of the plant. Concentrations of rubber in stems and petioles varied slightly with nutrient levels, and were inversely related to the dry weight values. Points of practical importance arising from the results are discussed. [Author's abstract.]

2199. CONSTABLE, D. H.
Manuring. Magnesium deficiencies in rubber.
Adv. Circ. Rubb. Res. Inst. Ceylon **37A**, 1954, pp. 2, illus.

Symptoms of magnesium deficiency in rubber, due in part to heavier potash manuring, are common in Ceylon, but often disappear after 2–3 years. The application of local dolomitic lime during the first 5 years after planting out and the addition of commercial epsom salts to the normal manurial mixture are recommended as preventive measures. For deficiency treatment dolomitic lime, with or without epsom salts, should be forked in, or, for quickest results, the trees should be sprayed with a 2% epsom salts solution plus sticker 2–3 times at weekly intervals, dolomitic lime being simultaneously applied on the soil surface.

2200. RUBBER RESEARCH INSTITUTE OF MALAYA.
Tapping prior to replanting.
Plant. Bull. R.R.I.M., 1954, No. 15, pp. 103-8, illus.

Methods of increasing the yield of old seedling rubber awaiting replanting are discussed. These include the use of yield stimulants, intensive tapping of renewed bark, tapping on a high cut in virgin bark, slaughter tapping, multiple cuts. Some of these methods can be combined.

2201. VAN EMDEN, J. H.
Notes on the incidence and control of *Oidium heveae* in Ceylon.
Quart. Circ. Ceylon Rubb. Res. Inst., 1954, **30**: 20-8, bibl. 5.

Environment, clonal susceptibility, manuring and dusting *vs.* spraying are discussed. In preliminary experiments dinitrocaprylphenylcrotonate (marketed as Mildex and Karathane) has shown promise both as a spray and when mixed with dusting sulphur. Control recommendations for the next refoliation season are 1 or 2 rounds of dusting with sulphur per week at 12 lb. per acre dependent on the severity of the attack.

2202. YOUNG, H. E.
Root disease in replanted areas.
Adv. Circ. Rubb. Res. Inst. Ceylon **49,** 1954 (?), pp. 4.

This circular supersedes No. 31 of 1951. It concerns incidence, poisoning of old stands, causative fungi and their detection (*Leptoporus lignosus*, *Fomes lamaensis*, *Poria hypobrunnea*), control, new plantings and survival of *Fomes* on new wood.

2203. VAN DEN TEMPEL, M.
Formation of carbon dioxide in fresh hevea latex. [Dutch and Indonesian summaries 1¼ pp. each.]
Arch. Rubb. Cult., 1954, **31**: 209-32, bibl. 11.

A study was made of the reactions which cause absorption of oxygen and formation of carbon dioxide in fresh hevea latex and their effects on the composition and properties of the latex. Carbon dioxide is formed in fresh latex chiefly by the metabolic processes of micro-organisms and also by decarboxylation of a carboxylic acid originally present in the rubber globules and possibly, to a very small extent, by direct oxidation with atmospheric oxygen.

2204. VAN ESSEN, W. J.
Determination of the dry rubber content of *Hevea brasiliensis* latex by the bromine reaction method. [Indonesian and Dutch summaries ½ p. each.]
Arch. Rubb. Cult., 1954, **31**: 189-207, bibl. 3.

An investigation has been made of the factors dominating the bromination of rubber in diluted latex. The method for the determination of the dry rubber content of latex as described by Maffei and Outa proved to be workable only under certain conditions. A revised method with a full description of the procedure is given. [Author's summary.]

Sapodillas.

(*See also* 2260r.)

2205. SAMBAMURTY, K., AND RAMALINGAM, V.
A note on hybridisation in the sapota (*Achras zapota* L.).
Indian J. Hort., 1954, **11**: 57-60, illus.

Descriptions are given of the leaves, flowers and fruits of a round-fruited type of sapodilla known as Cricket Ball and an oval-fruited type known as Oval. Their floral biology is outlined. Several species of bee visited the flowers, but were so rarely found to be carrying any pollen that it seems probable that pollination is mainly effected by wind. The technique employed in artificially cross-pollinating the two varieties is outlined, but out of 716 crosses made only 10 fruits matured from which 15 hybrid seedlings have been raised.

2206. GONZALEZ, L. G., AND FELICIANO, P. A., Jr.
The blooming and fruiting habits of the Ponderosa chico.
Philipp. Agric., 1953 (issued 1954), **37**: 384-98, bibl. 2, illus.

The Ponderosa variety of sapodilla has attained considerable popularity in the Philippines since its introduction in 1912 from the Botanic Gardens at Buitenzorg, Java. The fruit is of unusually large size and good quality and is suitable for drying. As it is sometimes regarded as a rather shy bearer a study was made of its blooming and fruiting habits and of its cross-compatibility with other forms of sapodilla. The flowers of Ponderosa begin to open at about 3 p.m. and are fully open by 1 a.m. the next day. On the fourth day of emergence of the pistil from the corolla, the stigma becomes receptive from 8 a.m. to 5 p.m. If pollination is unsuccessful the flower turns brown and falls off after 7 days; if successful, enlargement of the ovary is observed 2 weeks after pollination. The fruit matures in about 8½ months. Of the natural and artificial methods of pollination used, pollination by hand was the most effective, and open-pollination after emasculation the least. The pollen of native sapodillas induced more fruit set of Ponderosa flowers than that of the varieties Sawoe Manila and Java. Productivity depends on a number of factors and vigorous trees show a high percentage of fruit set. Unproductiveness is attributable partly to faulty pollination and partly to damage by a gelechiid moth.

2207. DEL ROSARIO, M. S. E., AND CENDAÑA, S. M.
Bionomics of *Eustalodes anthivora* Clarke, Gelechiidae, Lepidoptera.
Philipp. Agric., 1954, **37**: 455-67, bibl. 2, illus.

The larvae of *Eustalodes anthivora* feed on the floral organs of the sapodilla, *Achras sapota*, and from December to June during the main flowering season infestation ranged from 59 to 80%. Investigations on the life history of the pest and its control are described. In laboratory and field trials DDT, dieldrin and methoxychlor proved effective, but they caused slight injury to young foliage and flowers.

Sugar cane.

(*See also* 1187, 2260h, u, w, 2261g, l, o, 2286, 2296, 2301, 2313, 2314i.)

2208. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Report of the Experiment Station Committee for the year ending Sept. 30, 1954, pp. 80, illus.

A brief, semi-popular account is given of many lines of work, including: *By-products:* Chicken and cattle feed, container board, paper pulp, hardboard, cane wax, furfural, ammonia, lightweight concrete from cement and bagasse. *Cultural practices:* Fertilization (including aqua ammonia, and use of radioisotopes), controlled climate houses, irrigation, tillage, soil compaction. *Diseases:* Disease resistance trials of Hawaiian varieties in Fiji, diseases in Hawaii, sett germination increased by PMA treatment. *Factory:* Sugar losses in harvesting and cleaning. *Insects: Spodoptera mauritia*, an army worm moth new to Hawaii. *Mechanization:* Cutter-windrower-transport, side-mounted cutter-windrower, cutter pickup, irrigated cutter-only, portable cane dry cleaner, hydraulic grab, flume pickup, research on irrigation equipment. *Varieties:* Breeding, testing, the 1954 varietal position, flowering control, effect of radiation. *Weed control:* Herbicide research, including 3,4-D and dalapon, control of nutgrass and *Leucaena glauca*. *Yield decline:* Investigations to determine factors causing the yields of varieties to decline. [See also separate abstracts below.]

2209. QUEENSLAND.
Fifty-fourth Annual Report of the Bureau of Sugar Experiment Stations 1953/54, Brisbane, 1954, pp. 93, illus.

Among many items this report records the successful delay of cane flowering by foliage spraying with maleic hydrazide, Q.50's advent as the major variety in Queensland, ratoon stunting disease studies, varietal representation, the successful control of Fiji disease by the eradication of infected plants, experiments with bagasse as a soil amendment, the opening of an experiment station near Ayr, the growth mechanism of ratooning, the effect of 2,4-D on sugar content, wax investigations, herbicide trials, trash disposal experiments, nitrogen nutrition studies, the effect of maleic hydrazide on lawn grass growth, BHC soil toxicity experiments and germination trials. [See below for separate abstracts of several items.]

2210. ROBERTSON, C. L.
Development of the sugar industry in Southern Rhodesia.
Proc. 28th annu. Congr. S. Afr. Sugar Tech. 1954, pp. 12-25, illus.

Information is given on the Southern Rhodesian Government's pilot scheme on the Triangle Sugar Estate in the south-east of the territory. Subjects covered are area (1,173 acres in 1953), climate, soil, irrigation, research (fertilization, varieties, mulching, weed control, spacing, green manuring), varieties, costs, yields and markets. Commercial development by private companies is projected at Chirundu on the Zambesi and at Sabi-Lundi near the Triangle Estate.

2211. Rao, B. V., and Bhatta, K. L.
Sugarcane in Mysore—an account of recent work on varietal improvement.
Mysore agric. J., 1954, **30**: 166-76, bibl. 2.

An account is given of trials made in Mysore within the last 15 years with Hebbal Mysore, Irwin Canal and Coimbatore sugar cane varieties. Recommended varieties are: early—H.M. 645, Co. 636, I.C. 136, I.C. 201 and I.C. 225; midseason—Co. 631, Co. 634, Co. 417, I.C. 195, I.C. 203, I.C. 215 and I.C. 223.

2212. de Charmoy, D. d'E.
Études sur de nouvelles variétés de canne à sucre à l'Ile de la Réunion. (**Studies on new sugar cane varieties in Réunion.**)
Rev. agric. Réunion, 1954, **54**: 107-17, bibl. 1.

Three canes now widely planted in Réunion are R.337, M.134/32 and Co. 419 [see also *H.A.*, 24: 967 and 25: 1084]. Promising locally bred and introduced canes are R.336, R.380, R.386, R.397, R.430, B.34/104, B.37/161, M.423/41, M.213/40, B.41/227, B.40/105, Q.42, Q.50 and Saipan 17. Data from trials are tabulated and notes are given on some of the varieties mentioned.

2213. Hughes, C. G.
Germination studies.
A.R. Qd Bur. Sugar Exp. Stats 1953/54, 1954, pp. 74-5.

A germination trial made at Gordonvale, Queensland, in 1953 was designed to test phenyl mercuric acetate against "Aretan" (ethoxy ethyl mercury chloride) both in cold solutions at a strength of 0·015% mercury and in hot (50° C. for 2 hours) solutions at 0·003% mercury. The trial demonstrated clearly the necessity for a mercurial treatment, especially when the setts were subjected to the hot water. There was little to choose between the two mercurials for the control of pineapple disease, *Ceratostomella paradoxa*.

2214. Agarwala, S. B. D., and Prasad, S. N.
Hortomone-A and late planting of sugarcane.
Curr. Sci., 1954, **23**: 405-6.

In an attempt to offset the adverse effects of late planting setts of B.O. 11 were soaked for 12 hours in a 0·011% solution of Hortomone-A and were planted on 2 April. The examination of roots 42 to 50 days after planting showed that, by comparison with untreated setts planted on 25 March, the treated setts produced longer sett-roots and more numerous and longer shoot-roots. The treated setts showed 37·04% germination compared with 20·04% in the control.—Centr. Sugarcane Res. Stat., Pusa.

2215. Locsin, C. L.
Row spacing in sugarcane farming.
Sugar News, 1954, **30**: 448-50.

Three trials were recently made by the Victorias Milling Company to find out suitable row spacings for P.O.J. 2883 and H.37-1933. In the P.O.J. 2883 trials (one plant cane and two ratoon crops) a 3-foot spacing gave higher yields than 4-foot or 5-foot. In one of the H.37-1933 trials (plant cane only) 5 treatments combining different row spacings and methods of placing the setts were used, and the highest yield was given by the closest spacing, viz. 30 in., with a single line of setts planted horizontally. In the other H.37-1933 trial (plant cane only) 40-inch spacing gave a higher yield than 48-inch; the placing method was again a single line of setts.

2216. Lugo-López, M. A., and Capó, B. G.
The effect of weather and climate on the sucrose content of sugarcane. [Spanish summary 1 p.]
J. Agric. Univ. Puerto Rico, 1954, **38**: 149-69, bibl. 26.

Data on crops of commercial sugar cane varieties show that high sucrose contents are favoured by low rainfall, a relatively wide temperature range with cool nights and by sunlight as measured by total day-degrees (degrees above 70° F. for the crop period) except where night temperatures fall below 60° F. The sucrose content is also correlated with relative humidity, early ripening accompanying low humidity. Wind also affects sucrose, strong winds and consequent high rates of evaporation depressing yields.

2217. Haskew, H. C.
Flood damage to standing cane.
Cane Grs' quart. Bull., 1954, **18**: 48.

Figures are presented which show that partial or complete immersion of young cane for 2–3 days had little or no effect on the c.c.s. in the varieties Q.50, Q.47, Q.49 and Pindar.

2218. Lyons, E. S.
Fertilizer experiments with sugar cane.
Bull. Ga Coastal Plain Exp. Stat. **54,** 1954, pp. 10.

An account is given of 3 fertilizer experiments made during 1945/51 on sugar cane growing on fine sandy loam at the U.S. Sugar Plant Field Station, Cairo, Georgia, namely an NPK trial, a quantity of potash trial and a time of application trial. The results were: (1) The largest yield and the greatest return was from a complete fertilizer containing N, P_2O_5 and K_2O each at 72 lb. per acre. (2) When N was supplied at only 36 lb. per acre (4-8-8) the yield of cane was 2·21 tons less per acre than for the 72-lb. application. (3) K was the most efficient of the three fertilizer elements, and even when used alone it showed a profit. Any combination of K with N or with P and N gave good increases and profitable returns. (4) N when applied with P and K gave larger and more profitable yields at 72 lb. per acre than at 36 lb. but N without K gave small and unprofitable returns. (5) P alone or in combination with N gave very small, unprofitable increases. (6) No advantage was gained from making a split application of fertilizer, but if it should prove impracticable to make the full application at the outset, a part of the fertilizer may be applied in May or June with little or no reduction in yield.

2219. Hawaiian Sugar Planters' Association.
Tagged nitrogen experiments yield important data.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1953/54, pp. 8-9.

Six single-stool ratoon plots received 180 lb. N^{15} and were harvested when 18 months old. In the stool which received all the N in a single application (1) 32% of the fertilizer N was recovered in the plant instead of the usual 50%; (2) 40% of the fertilizer taken up had been discarded in the dry leaf before harvest, this amount being equal to that in the tops and stalks at harvest; (3) the upper 18 in. of the soil still held 60% of the fertilizer N after 18 months. A difference of 6 months in time of application did not measurably affect the amount of fertilizer N in the leaves at 18 months old.

2220. Lal, K. N., and Tandon, J. N.
Effect of NH_3: NO_3 ratios on growth and physico-chemical properties of sugarcane sap.
Sci. and Cult., 1954, **20**: 239-41, bibl. 4.

Pot experiments on Co. 453 showed that a NH_3: NO_3 ratio of 0·5 favoured leaf weight and shoot number, whereas a ratio of 1·0 favoured shoot height and millable cane yield and a ratio of 2·0 favoured root growth and dry leaf trash weight. The results are given of a study of 8 physico-chemical properties of the sap of stem and leaf at ratios from 0·2 to 5·0; the properties investigated were density, surface tension, viscosity, osmotic pressure, solution concentration, electrical resistance, pH, electrical potential and specific electrical conductivity.—Plant Phys. Lab., Banaras Hindu Univ.

2221. Knust, H. G.
Single *vs.* split dressings of sulphate of ammonia.
A.R. Qd Bur. Sugar Exp. Stats 1953/54, 1954, pp. 45-6.

The effect of splitting the nitrogen dressing was investigated on Q.50 and C.P. 29/116 growing on nitrogen-depleted land. The treatments were no dressing, 300 lb. sulphate of ammonia per acre in December, and a total of 300 lb. in 2, 3 or 4 equal amounts in November/December, November/December/January and November/December/January/February. The results with the plant cane crop are given. With Q.50 there were no significant differences between the nitrogen treatments. With C.P. 29/116 the split dressings exceeded the control in cane per acre at the 1% level, and the November/December treatment exceeded the control in tons of sugar per acre at the 1% level and the single dressing at the 5% level. In juice analyses Q.50 exceeded C.P. 29/116 at the 1% level in each one of 4 successive months.

2222. Story, C. G.
Molasses plus sulphate of ammonia.
Cane Grs' quart. Bull., 1954, **18**: 56-8, illus.

In the Mackay district the practice is to apply molasses alone at 6 tons per acre after harvesting the plant crop and to follow it in subsequent years with ammonium sulphate alone. Recent investigations show that (1) the response from molasses is not always as great in the first as in the second and third year after application; (2) molasses plus 1–2 bags ammonium sulphate per acre after the plant crop gives better results than molasses alone.

2223. Hawaiian Sugar Planters' Association.
Significant facts on phosphorus obtained.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1953/54, p. 9.

Effects of temperature on P uptake. Studies show that P uptake is markedly reduced by reductions in either air or root temperatures. *P levels in the plant.* Studies show that internodes are better indicators of P utilization than leaf blades or sheaths and that the critical level for internodes 8 to 10 is 0·031–0·034% P.

2224. Samuels, G., and Landrau, P., Jr.
The influence of potassium on the yield and sucrose content of sugarcane. [Spanish summary $\frac{2}{3}$ p.]
J. Agric. Univ. Puerto Rico, 1954, **38**: 170-8, bibl. 7.

Critical analysis of the results of over 200 field experiments with potash fertilizers on sugar cane, covering a wide range of cane varieties and soil types of Puerto Rico, revealed the following: (1) Potash increased cane yields mainly on the red and yellow podzolic soils of the humid area and on a planosol of the semi-arid area. There was slight, if any, response to potash in the irrigated area. (2) Potash increased sucrose concentration only when cane yields were also increased by 10% or more. (3) When potash significantly influenced sucrose concentration, the polarization value of the cane juice increased. Brix and percentage extractability of juice were not appreciably affected. (4) The use of foliar diagnosis has proved to be of great value in Puerto Rico in determining when to apply potash fertilizers to sugar cane. Leaf values of 2% or more on a dry-weight basis indicate that no response to potash applications can be expected for soils and varieties in Puerto Rico. Values below 1·80% indicate that a response to potash fertilizers may be expected in the humid areas. [From authors' summary.]

2225. S[tory], C. G.
Copper deficiency in the Central Area.
Cane Grs' quart. Bull., 1954, **18**: 61, illus.

Copper deficiency in cane occurs in the Mt. Pelion-Mt. Ossa area of the Mackay district. In a trial planted in 1949 the application of 55 lb. copper sulphate per acre gave complete control.

2226. Knust, H. G.
The long-range trash trial.
A.R. Qd Bur. Sugar Exp. Stats 1953/54, 1954, p. 44.

In 1953 the first ratoon of the 6th rotation was harvested in a long-term trial at Bundaberg Station in which the practice of conserving trash in alternate interspaces is being compared with the normal procedure of burning all trash and tops. Under the conditions of the experiment there does not appear to be any advantage accruing from the more costly trashing method. Yields of the 13 crops so far harvested are tabulated.

2227. Pembroke, E. A.
A method of disposal of crop residues in North Queensland.
Cane Grs' quart. Bull., 1955, **18**: 89-90, illus.

A grower's effective method of disposal of abundant trash is described. After the standing crop has been removed, every sixth interspace is furrowed with a plough. The residue is then raked up with the conventional hay rake travelling at right angles to the cane row. The rake load is dumped at each disposal furrow across the block and left to dry out. The windrows are then burnt and any remaining refuse is covered during subsequent ratooning operations. In the following year the interspace adjacent to that previously drilled is opened up to take the crop residue.

2228. BUZACOTT, J. H.
Arrowing delayed chemically.
A.R. Qd Bur. Sugar Exp. Stats 1953/54, 1954, p. 49.
SKINNER, J. C.
The control of growth using maleic hydrazide.
Cane Grs' quart. Bull., 1954, **18**: 39-40, illus.

A comprehensive experiment using 0·25, 0·5 and 1% solutions of maleic hydrazide was carried out on two early-arrowing varieties, C.P. 29/116 and P.O.J. 2725. The heavier application caused severe yellowing and some stunting of the plants, but the cane recovered rapidly. The final result showed that 1·0% MH applied 10 to 12 weeks before the normal flowering time was the most effective method of delaying arrowing for a period of several weeks.

The second paper mentions that it is now a regular practice to delay the flowering of early-flowering varieties for breeding purposes by spraying the upper leaves with 1·0% MH 10 to 12 weeks before flowering. It also describes experiments on the inhibition of growth and flowering in a lawn consisting of Mackey's couch grass, *Chrysopogon acicularis* [see also abstract 1936].

2229. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Flowering controlled by withdrawal of water and with chemicals.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1953/54, pp. 50-1, illus.

Two practical methods of flower inhibition are (1) the withholding of irrigation water for about 6 weeks in hot, dry weather, and (2) the application of chemical sprays, for example maleic hydrazide, which prevents flowering without materially lessening growth. Other observations concerning flowering are: (1) high N reduced flowering by about 20% compared with low N; (2) shade (20% full sun) and high humidity did not induce arrowing in 7 reluctant varieties.

2230. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Effects of radiation on sugar cane.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1953/54, pp. 51-3, illus.

Treatment of the shy-flowering variety 37-7028 with gamma rays from cobalt 60: (1) failed to induce flowering; (2) did not materially reduce total growth when applied in small doses but did overcome the dominance of the terminal bud with resulting production of laterals; (3) caused the production of numerous laterals when applied in prolonged mild doses; (4) reduced growth and killed the terminal bud when applied in very high doses.

2231. FRAPPA, C.
Sur la présence de la maladie de Fidji dans les plantations de cannes à sucre de la côte est de Madagascar. (**The occurrence of Fiji disease in sugar plantations on the east coast of Madagascar.**)
C.R. Acad. Agric. Fr., 1954, **40**: 560-3.

Typical primary symptoms of Fiji disease have been observed in sugar plantations on the east coast of Madagascar. The vector of the disease is the larva, and sometimes the adult, of *Perkinsiella saccharicida*; after an infective feeding period of at least 20 hours, the larvae remain infectious for 16 days or longer. Incubation periods in sugar cane plants vary from about 30 to 230 days, depending upon their vegetative state. Immediate control measures are to uproot and burn infected plants, and apply BHC dust for vector control. Long-term control measures require the study of suitable resistant varieties for introduction into Madagascar and of predators and parasites of the vector.

2232. ZABALA, S.
El mosaico en algunas variedades de caña de azúcar. (**Mosaic in some sugar cane varieties.**)
Idia, 1954, No. 78, p. 10.

Mosaic resistance in some sugar cane varieties was determined by inoculation tests at the Villa Alberdi Experimental Station in the Tucumán province of Argentina. Mosaic-free varieties, in which the disease was not found after inoculation, include 4 Canal Point, 3 Tucumana and 5 Villa Alberdi varieties. Very resistant varieties (symptomless carriers) are C.P. 34/120, Tucumana 2683 and Villa Alberdi 4628 and 6967. Resistant varieties (showing mild symptoms) are C.P. 43/74, 5 Tucumana varieties and Villa Alberdi 5992. Tucumana 1190 was susceptible. The mosaic-free varieties Tucumana 2645 and C.P. 29/116 are vigorous and high-yielding.

2233. HUGHES, C. G.
Ratoon stunting disease.
A.R. Qd Bur. Sugar Exp. Stats 1953/54, 1954, pp. 68-73, illus.

Information is given on studies on hot-water treatment, symptoms, and time-temperature relationships of the virus in diseased setts. A resistance trial planted at Mackay in 1952 showed that setts of the following varieties could be inoculated with the disease (as indicated by the discoloured bundles in the growing stalk) but not show any stunting in the subsequent plant or ratoon crops: C.P. 29/116, C.P. 36/183, D.166-34, P.O.J. 2961, P.O.J. 2967, P.O.J. 3016, and Q.50, while M.112/34 and Q.58 showed considerable stunting. The reactions of 38 approved varieties to ratoon stunting disease are tabulated.

2234. HUGHES, C. G.
Ratoon stunting disease yield trials.
Cane Grs' quart. Bull., 1955, **18**: 71-5.

The results are given of trials planted in 1953 to determine losses in plant crop yield due to ratoon stunting disease in some popular commercial varieties compared with those of Q.28, which showed substantial losses in earlier trials [*H.A.*, 23: 3608]. The losses with Pindar, Trojan and N.Co. 310, for example, were 14, 23 and 20% respectively. Other varieties tested were Q.50, P.O.J. 2878 and C.P. 29/116. In several trials Q.50 did not show losses when other canes suffered severely.

2235. HAWAIIAN SUGAR PLANTERS' ASSOCIATION.
Ratoon stunting disease commands attention.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1953/54, pp. 22-3, illus.

The results of studies were: (1) the disease is controlled by hot-air treatment at 54° C. for 8 hours and by hot-water treatment at 52° C. for 1½ and 2 hours, but the hot-water treatment markedly reduced germination; (2) it is readily transmitted by cane knives and cane juice; (3) no transmission occurred when knives were swabbed with 5% lysol, 50% alcohol, 1-100 PMA or 1-100 Bionol; (4) no symptoms developed on varieties inoculated with filtered disease-juice; (5) no symptoms developed on 47-4991 when inoculated with disease-juice from the same variety which had been frozen for 3 months; (6) plants grown from cuttings treated with hot water and immediately dipped in disease-juice showed 90% infection compared with 31% in those allowed to dry for 2 hours before dipping; (7) no evidence of the existence of different strains of the disease was obtained, but there were differences in varietal tolerance, 37-1933 being particularly susceptible; (8) no root transmission occurred.

2236. King, N. C.
The hot water treatment of sugarcane setts.
Proc. 28th annu. Congr. S. Afr. Sugar Tech. 1954, pp. 136-9, bibl. 3, illus.

A description is given of hot water treatment tanks for laboratory use, for planters' use and for use where steam is available. In a test on the effect of treatment on germination setts of 10 varieties were subjected to 52° C. for 1½ hours, 54° C. for 1¼ hours and 50° C. for 2 hours, and subsequently germinated under different conditions. The severer treatments were too much for most varieties, but under good field conditions 50° C. for 2 hours gave germination equal to the control except with Co. 331 and Uba. The treatments tended to inhibit rooting, but in the case of the lowest temperature this did not affect the rate of germination; with N: Co. 310, in fact, germination was more rapid than in untreated control setts.

2237. Steib, R. J., Thaung, M. M., and Wang, L.
Effect of heat treatment tests on the germination and yields of sugarcane.
From abstr. in *Phytopathology*, 1954, **44**: 507.

Stalks infected with ratoon stunting disease were subjected to hot water treatment at 50–52° C. for a period of 1–2 hours and to hot air treatment at 54° C. for 8 hours. The germination rate was seriously lowered by all hot water treatments but only slightly lowered by the hot air treatment. Yield tests of susceptible varieties grown from treated setts showed an increase in the plant cane crop and much more vigorous growth in the first ratoon crop by comparison with untreated cane.

2238. Appanna, M., Usman, S., and Sastry, K. S. S.
A note on the change in the status of the sugarcane leaf-hopper, *Dictyophara pallida* (Don.) (*Pyrilla perpusilla* Walker), in Mysore.
Mysore agric. J., 1954, **30**: 19-26, bibl. 10, illus.

Dictyophara pallida has established itself as a sugar cane pest, though not yet a serious one, in the Visvesvaraya Canal Tract, Mandya District, since 1951. DDT sprays and BHC dusts have been effective against both adults and nymphs in small-scale field trials.

2239. Mungomery, R. W.
Long-range soil toxicity investigations.
A.R. Qd Bur. Sugar Exp. Stats 1953/54, 1954, pp. 63-4.

BHC was applied to 2 plant crops at rates ranging from the standard recommendations for 1-, 2- and 3-year grub control to abnormally high yearly re-treatments. To accelerate the progress of the trial BHC dust was also ploughed in before planting in amounts equal to the estimated residuum from each respective treatment in a previous cropping cycle. Two dusts of the same strength were used, one from crude 13% gamma and the other from refined 88% gamma BHC. The differences in yield between the treated plots and untreated controls were not significant.

2240. King, N. C.
The mounting and preservation of plant material in their natural colours.
Proc. 28th annu. Congr. S. Afr. Sugar Tech. 1954, pp. 146-7, illus.

The formulae are given of several solutions for the preservation of sugar cane leaf and stem material and the method of mounting specimens in perspex jars is described.

Tea.

(*See also* 1275c, 2260f.)

2241. Tea Research Institute of Ceylon.
Annual Report of the Tea Research Institute of Ceylon for the year 1952, being *Bull.* **34**, 1954, pp. 55.

Work covered by this report includes: *Chemistry*. Effect on tea root systems of burying prunings in tea areas, nitrogen nutrition, leaf analysis (calcium, carotene, enzymes, copper residues, manganese and quality), withering, factors supposed to affect quality of made tea. *Plant Physiology*. Selection and vegetative propagation, resistance to *Pratylenchus pratensis* and blister blight, root systems, single- *vs.* double-node cuttings, effect of initial state of bud development on rooting and growth of cuttings, propagation of *Erythrina lithosperma*, control of *Imperata cylindrica* and *Panicum repens* and effects of herbicides on tea, fish leaf plucking experiments, phosphate quality experiment. *Pathology*. Blister blight control, low-country pests, green manures and shade trees for low-country sites, spray equipment, *Rhizoctonia solani* control, tea mycorrhiza studies. [For separate abstracts of some items see below.]

2242. Walter, T. E.
Present activities in the low-country.
Tea Quart., 1954, **25**: 57-61.

Particulars are given of tea experiments now in progress in the low-country of Ceylon and their results to date. *NPK experiment* (*Vogan Estate*). Two levels of each element are being applied, viz. 39 and 78 lb. N, 18 and 36 lb. P_2O_5 and 24 and 48 lb. K_2O per acre, to a field where the yield was low (500 lb. per acre). The double doses have not given increased yields. *Pruning cycle cum Rhizoctonia control* (*Ingiriya Estate*). Pruning cycles of 1½, 2, 2½ and 3 years are being compared. Preliminary results suggest that *Rhizoctonia* may not be responsible for die-back; bordeaux has failed to control it. *Vegetative propagation* (*Vogan Estate*). A trial of 30 selected clones has been laid down. *Rhizoctonia control experiment* (*Galbode Estate*). Thatching the soil with Guatemala grass or paddy straw every 3 months or weekly removal of diseased tea leaves reduces disease incidence considerably. Spraying with perenox or bordeaux and high tipping have had no effect. *Shot-hole borer control experiments* (*Galbode Estate*). Dieldrex spraying gave good control on a 10-day cycle and on a 6- and 12-week but not an 18-week cycle. *Shade experiments* (*Galbode Estate*). An *Albizzia moluccana vs. Grevillea robusta* trial has been laid down.

2243. Portsmouth, G. B.
Comparison of single and double node cuttings.
A.R. Ceylon Tea Res. Inst. 1952, 1954, p. 33.

The rooting of standard single-node cuttings was compared with that of double-node cuttings in which the basal cut, instead of being made just above the lower bud, was made just below the lower node, the leaf being removed. The rate of rooting was only 37·5% in the double-node compared with 58% in the single-node cuttings.

2244. Portsmouth, G. B.
Effect of the initial state of bud development on the rooting and growth of cuttings.
A.R. Ceylon Tea Res. Inst. 1952, 1954, p. 34.

Rooting and subsequent growth were studied in single-node cuttings taken (1) with the bud dormant, (2) with the bud starting to grow, (3) with the shoot developed to a bud and 3 leaves, and (4) as (3) with the shoot broken back. Those taken with the bud starting to grow rooted best (60% strike) and grew best during the first 6 months. Cuttings taken when the bud was dormant also rooted well (54%) but showed slow subsequent development.

2245. Temminck, O. R.
Practijk-ervaringen met stekken van thee. **(Practical experience with tea cuttings.)**
Bergcultures, 1954, **23**: 557-71, illus.

Ripe wood was used, and leaf cuttings taken with a bud and the internode below. The cuttings were inserted into well-prepared nursery beds at a depth of 5 cm. The beds were shaded by a fern roof, and protected by bamboo screens. The ground was kept very moist for 1 month after planting. Callusing was observed after 5 weeks and rooting after about 10 weeks. After 6 months, when the cuttings were well rooted the shade roof was allowed to disintegrate, so that the plants were hardened off at 12 months. The best results (75% rooting) were obtained with the clone Kiara 8. Cuttings inserted in soil in bamboo pots rooted successfully, giving downward-rooting plants easy to transplant as replacements.

2246. Wiersum, L. K.
Opmerkingen betreffende het stekken van thee in de practijk. (**Observations on taking tea cuttings in practice.**) [English and Indonesian summaries ½ p. each.]
Bergcultures, 1954, **23**: 583-99, bibl. 11, illus.

This article is intended to supplement that by Temminck [see preceding abstract]. Recommendations are given on establishing a propagating plot, choice of nursery site and care of cuttings. It is estimated that a full-grown tea-bush can provide enough material for 500–1,500 cuttings per year. Cuttings of free-rooting clones may be planted at 10×15 cm., but closer planting is advised for poor-rooting clones. The results of rooting experiments with a large number of clones are tabulated.

2247. Malaya Department of Agriculture.
Notes on current investigations, research April to June, 1954. Tea.
Malay. agric. J., 1954, **37**: 176-7.

As the result of a trial in Cameron Highlands it is proposed to adopt a ⅔ sawdust-⅓ loam mixture as a standard medium for rooting tea cuttings. Good drainage, however, seemed to be more important than the medium used. Hormones had no effect.

2248. Jayaraman, V., and de Jong, P.
Some aspects of the nutrition of tea in Southern India.
Trop. Agriculture, Trin., 1955, **32**: 58-65, bibl. 7, illus.

The results are discussed of a 12-year factorial experiment to assess the response of tea to 3 levels of N, P and K. Applications of N at 40 lb. per acre had little effect on yield, compared with no N, but applications at 80 lb. per acre produced a highly significant response. P_2O_5 applied at 20 or 40 lb. per acre had no significant effect on yield compared with no P. During the eighth year of the experiment and in subsequent years applications of K at both 20 and 40 lb. K_2O per acre had significant effects on yield. In the absence of K there was a marked reduction in the number of bushes per acre, mainly because the K-starved bushes were less well able to recover from pruning. Indications of an interaction between N and K are not borne out by conventional methods of statistical analysis. This problem is discussed in relation to the effect of these nutrients singly and in combination on plant density and yield.—Sci. Dep., U.P.A.S.I.

2249. Portsmouth, G. B.
The fish leaf plucking experiment.
A.R. Ceylon Tea Res. Inst. 1952, 1954, p. 38-9.

The treatments reversed in the previous cycle were again reversed in the fourth cycle. A reversion to fish leaf after normal plucking gave an increase of only 119 lb. per acre compared with 476 lb. in the previous cycle. The most serious effect of continuous fish leaf plucking was the great reduction in maintenance leaf and pruning wood carried by the bushes. At the end of the fourth cycle only 972 and 1,617 lb. respectively had been removed compared with 3,286 and 5,830 under continuous single leaf plucking.

2250. Loos, C. A.
Crop protection experiments.
A.R. Ceylon Tea Res. Inst. 1952, 1954, pp. 40-1.

Weekly and fortnightly applications of perenox at 4 oz. in 10 gal. water applied at an average rate of 12 gal. per acre were made in an experiment on the control of blister blight at St. Coombs. Over the first 3½-year cycle (1949/52) the yields in made tea per acre were 2,296 lb. in the control, 2,757 lb. under fortnightly treatment (a 20% increase) and 2,897 lb. under weekly treatment (a 26% increase over the control). The weight of maintenance foliage and pruning wood removed in pruning during the cycle was 7,135 lb. per acre in the control, 10,603 lb. (49% more) under fortnightly treatment and 11,077 lb. (55% more) under weekly treatment.

2251. LANDRETH, J.
A miniature roller for clonal experiments.
KEEGEL, E. L.
A note on the operation of the miniature roller.
Tea Quart., 1954, **25**: 66, illus., and 66-7.

The main features are described of a miniature roller taking a charge of 1 lb. of withered leaf which was recently constructed at the Tea Research Institute of Ceylon for clonal experiments. It is a one-sixth scale version of a full-size single-action roller. The pressure pad has been modified to take a piece of perspex sheet in order that circulation of the leaf may be observed. Two important considerations in the operation of the apparatus are discussed in the second note. The roller should not be so constructed as to cut up the leaf unduly. The rolling time must be much longer than in normal commercial practice, because, owing to the small amount of leaf used, fermentation is slow.

2252. CARTWRIGHT, R. A., AND ROBERTS, E. A. H.
Theogallin, a polyphenol occurring in tea.
J. Sci. Food Agric., 1954, **5**: 593-7, bibl. 11.

A polyphenol, now named theogallin, detected by paper chromatography in tea-leaf, has been shown not to be identical with *m*-digallic acid as originally thought. A method of preparation is described but the final product still contains appreciable impurities. Its reactions suggest it to be a depside of gallic acid with some highly hydroxylated organic acid. [Authors' abstract.]—Indian Tea Ass. chem. Lab., London.

2253. CARTWRIGHT, R. A., ROBERTS, E. A. H., AND WOOD, D. J.
Theanine, an amino-acid N-ethyl amide present in tea.
J. Sci. Food Agric., 1954, **5**: 597-9, bibl. 6.

Theanine, isolated from Japanese green tea by Sakato, has been shown to be identical with a previously uncharacterized amino-acid reported in both fermented and unfermented tea-leaf. [Authors' abstract.]—Indian Tea Ass. chem. Lab., London, and Tocklai exp. Stat., Assam.

Sundry crops.

(*See also* 1379, 2260i, 2261h, i, u.)

2254. BHOJRAJ NAIDU, N., AND SALETORE, S. A.
Studies on *Annona squamosa* (*sitaphal*) seed. III. Production and collection in Hyderabad.
Indian J. agric. Sci., 1954, **24**: 253-9. bibl. 6.

The seed oil of the custard apple, which is abundant in Hyderabad State, closely resembles groundnut oil. An investigation into the amounts of fruit and seeds available and into the collection and cleaning of seed from a market suggests that it should be economical to produce the oil for use in soap manufacture.

2255. RAGHAVAN, V., AND MURTHY, K. N.
Occurrence of bisexual flowers in an arecanut palm.
Sci. and Cult., 1954, **20**: 239, bibl. 2, illus.

A description is given of an abnormal inflorescence bearing male, female and bisexual flowers observed in an *Areca catechu* palm in Assam.—Univ. Bot. Lab., Gauhati Univ.

2256. MASSAL, E., AND BARRAU, J.
Breadfruit.
S. Pacific Commiss. quart. Bull., 1954, **4** (4): 24-6, bibl., illus., from abstr. in *Trop. Abstr.*, 1955, **10**, No. c247.

A brief review on *Artocarpus altilis*. The fruit contains a relatively large amount of B vitamins, notably niacin. Recommendations are made on cultivation, propagation and use of the fruit.

2257. TORRES, J. P.
Commercial propagation of caimito.
Philipp. J. Agric., 1953 (issued 1954), **18**: 31-43, bibl. 6, illus.

Among many methods of propagation tested on the star apple, *Chrysophyllum cainito*, tongue-inarching proved the most practicable. Patch-budding also gave good results and could be used when stocks had become too large for tongue-inarching. The star apple was also easily propagated by marcotting but this procedure requires much larger branches, about an inch or more in diameter. The techniques employed in tongue-inarching, patch-budding and cleft-grafting are described.

2258. ULLAH, H., AND KHAN, M.-U.-D.
Some aspects of jujube (*Zizyphus jujuba*) (ber) cultivation in the Punjab.
Punjab Fruit J., 1954, **18** (66/7): 16-20, illus.

Aspects dealt with include varieties, fruit characters and composition, yields, time of ripening and use as a windbreak.

2259. DUTTA, S.
Jujubes of Assam.
Indian J. Hort., 1954, **11**: 53-6, bibl. 6, illus.

Botanical descriptions, with notes on their economic importance, are given of 6 varieties of jujube, 5 of which are assigned to *Zizyphus mauritania* and one to *Z. jujuba*.—Dep. Agric., Tezpur, Assam.

Noted.

2260.

a AMAND, H.
La sélection de l'hévéa à Yangambi. **(Hevea selection and breeding at Yangambi.)**
Bull. Inf. INEAC, 1954, **3**: 317-30.
Principles and techniques.

b BETREM, J. G.
Possibilités de lutte biologique contre les *Oryctes*. **(Possibilities of biological control of *Oryctes*.)**
Oléagineux, 1955, **10**: 23-4.
By means of the grub parasites, *Scolia* spp.

c BONNET, R.
Cetico et hévéa: deux richesses de l'Amazonie péruvienne. Relevé d'observations pratiques effectuées en 1952-1953. **(Cetico and hevea: two valuable crops of Peruvian Amazonia. Summary of practical observations made in 1952/53.)**
Ann. Inst. nat. agron., 1953/54, **40**: 173-252, illus.
Cecropia spp. for paper pulp and hevea in Peru; a detailed account.

d BURGOS L., J. A.
Comentarios y recomendaciones sobre el cultivo de cacao en las provincias de Jaén y Bagua, Perú. (**Comments and recommendations on cacao growing in the provinces of Jaén and Bagua, Peru.**)
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 8, bibl. 1.
Including irrigation, seed selection, shade, manuring and cover crops.

e CARPENTER, J. B.
An epidemic of phytophthora leaf fall of hevea rubber trees in Costa Rica.
Phytopathology, 1954, **44**: 597-601, bibl. 7, illus.
Phytophthora palmivora and its effects.

f CENTRALE VERENIGING VAN PROEFSTATIONS VOOR OVERJARIGE CULTURES IN INDONESIE.
A record of organization, history and activities of Experiment Station C.P.V. (Centrale Proefstations Vereniging) Bogor, Indonesia. [Indonesian, Dutch and English text.]
C.P.V., Djakarta-Kota, Indonesia, 1954, pp. 15+vii, illus.
For research on rubber, tea, coffee, cacao and cinchona.

g CHAMPION, J.
La culture bananière aux Antilles et en Amérique centrale. II. La culture bananière en Jamaïque. (**Banana growing in the Antilles and Central America. II. In Jamaica.**)
Fruits d'Outre Mer, 1954, **9**: 473-88, bibl. 1, illus.

h CHARAVANAPAVAN, C.
Improved methods of producing cane and palm jaggery.
Trop. Agriculturist, 1954, **110**: 117-21, bibl. 5.
Including methods of tapping the palms *Caryota urens* and *Borassus flabellifer.*

i CHOUDHRY, B. L.
Ramphal is a good fruit.
Indian Fmg, 1954, **4** (9): 15, 21, illus.
Cultural notes on *Annona reticulata.*

j DECKER, J. S.
Cultura da goiabeira. (**Guava growing [in Brazil].**)
Bol. Minist. Agric. Brasil, 1951, No. 1, reprinted as *Publ. Secr. Agric. São Paulo* **840**, 1952, pp. 22 [received Dec., 1954].

k DESROSIERS, R., BOLAÑOS, C. W., AND VARGAS, J.
Evaluation of clones of cacao for resistance to witches' broom.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 9, bibl. 3.
The use of a brooms/age ratio is suggested.

l FENNAH, R. G.
Studies on cacao beetle (*Steirastoma breve* Sulz. Lamiidae). I. Larval incidence in relation to manurial treatment and light intensity. II. Carbohydrate digestion in the cacao beetle.
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 73-5 and 75-9, bibl. 5.
An ecological and physiological approach.

m FRASELLE, J. V.
Deux maladies du caféier d'Arabie en Ituri. (**Two diseases of arabica coffee in Ituri.**)
Bull. Inf. INEAC, 1954, **3**: 337-42, illus.
Agromyzid root borer and *Armillaria mellea.*

n GARCÍA, C.
Contribución al estudio de la variabilidad de la población cacaotera de Colombia. (**Contribution to a study of the variation in cacao populations in Colombia.**)
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 9.
Types of cacao found in different districts.

o GREENWOOD, C. T., AND ROBERTSON, J. S. M.
Physicochemical studies on starch. Part I. The characterization of the starch present in the seeds of the rubber tree, *Hevea brasiliensis.*
J. chem. Soc. Lond., 1954, pp. 3769-78, bibl. extensive in text.

p GRIMALDI, J.
Les maladies cryptogamiques du cacaoyer au Cameroun. (**The fungus diseases of the cacao tree in the French Cameroons.**) [English and Spanish summaries $\frac{3}{4}$ p. each.]
Agron. trop., 1954, **9**: 544-62, illus.

q GRIMALDI, J.
La maladie "du dessèchement des extrémités" du cacaoyer au Cameroun. (**Cacao dieback in the French Cameroons.**)
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 5.
Capsid followed by *Calonectria rigidiuscula* controlled by pruning followed by bordeaux-BHC spray.

r GUTIÉRREZ TEXIDÓ, G., AND PARRADO ALVAREZ, J. L.
Zapote o níspero sin semilla. (**A seedless sapodilla.**)
Rev. Agric. Habana, 1954, **37** (2): 81-2, illus.
Notes on a tree found in Cuba.

s HADDOCK, D., AND MIRABAL, R. A.
Precios que recibio el agricultor por su cafe, Puerto Rico, 1938-39 al 1949-50. (**Farm prices for coffee in Puerto Rico, 1938/39 to 1949/50.**)
Bol. Estac. exp. agríc. Rio Piedras **119**, 1954, pp. 20, bibl. 3.
Acreages, people employed and economics; for previous review see *H.A.*, 11: 206.

t HAVORD, G.
Mulching for cacao.
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **1**, pp. 12, bibl. 6.
A review.

u HES, J. W.
The influence of suckers on the yield of sugarcane.
Sugar J., 1954, **17** (5): 25, 28, 30-1, bibl. 6.
A review.

v VAN HEUSDEN, W. C.
Een bloemlezing uit de kinaliteratuur van 1854-1954. (**A bibliography of cinchona literature from 1854 to 1954.**)
Bergcultures, 1955, **24**: 48-52, bibl. 114.

w HUGHES, C. G.
The variety Q.28.
Cane Grs' quart. Bull., 1954, **18**: 46-7.
Production, characters and performance.

x KIRKPATRICK, T. W.
Notes on minor insect pests of cacao in Trinidad. Part 2. Lepidoptera (butterflies and moths).
A.R. Cacao Res. I.C.T.A. 1953, 1954, pp. 67-72, bibl. 6.
Leaf eaters, pod borers and pod miners.

y MCCLOY, J.
Artificial drying in remote territories and the fuel problem.
World Crops, 1955, **7**: 109-13, bibl. 69, illus.
A review mentioning many plantation crops, spices, etc.

z MENON, P. M. K.
Green manures for coconut gardens.
Bull. Indian centr. Coconut Cttee, 1954, **8**: 153-4, illus.
Crotalaria juncea and *C. striata* recommended for Travancore-Cochin.

2261.

a MIDDLETON, G. B.
Crescent bunds. Husk platforms for palms on steep hillsides.
Ceylon Coconut Quart., 1954, **5**: 84-8, illus.
Semi-circular walls of husks to check erosion.

b NAYAR, T. G.
Commercial cultivation of hill bananas (Vella Vazhai, syn. Virupakshi, eco. type Sirumalai).
S. Indian Hort., 1954, **2**: 146-50, bibl. 4.
Including a botanical description of the variety.

c PARHAM, B. E. V.
Cacao at Naduruloulou, 1953.
Agric. J. Dep. Agric. Fiji, 1954, **25**: 24-6, illus.
Work in progress in Fiji.

d PIELLARD, —.
Le conditionnement du cacao des territoires outre-mer. (**The grading of cacao in the [French] overseas territories.**) [English and Spanish summaries ¼ p. each.]
Agron. trop., 1954, **9**: 595-609, bibl. 2.

e PIELLARD, —., HAHN, —., AND ADDA, —.
La préparation du cacao. (**Cacao processing.**) [English and Spanish summaries ½ p. each.]
Agron. trop., 1954, **9**: 584-94, bibl. 6.
Harvesting, fermentation and drying.

f PINTO, G. P. P.
Notas preliminares sôbre a seleção de cacau na Bahia, Brasil. (**Preliminary notes on cacao selection in Bahia, Brazil.**)
[*Proc.*] *V Reunión Com. téc. interamer. Cacao 1954*, Vol. **2**, pp. 13, bibl. 12.
Selection begun in 1952.

g QUILICI, G.
Relazione sulla biologia delle *Diatraea* Guild, e sulla lotta praticata contro di esse nel Venezuela. (***Diatraea*, its biology and its control in Venezuela.**) [English summary 4 lines.]
Riv. Agric. subtrop., 1954, **48**: 235-48, bibl. 6, illus.

h RAJAGOPALAN, T. S.
Select references on cashewnut (*Anacardium occidentale* Linn.).
S. Indian Hort., 1954, **2**: 113-16, bibl. 90.
A bibliography.

i RAJAGOPALAN, T. S.
Select references on jack (*Artocarpus heterophyllus* Lam.).
S. Indian Hort., 1954, **2**: 154-5, bibl. 27.
A bibliography.

j RENAUD, R.
Les maladies à virus du cacaoyer de l'Ouest africain. (**The virus diseases of the cacao tree in West Africa.**) [English and Spanish summaries ½ p. each.]
Agron. trop., 1954, **9**: 517-43, bibl. 149, illus.
Notably swollen shoot.

k RISDON, E. J., AND VEERABANGSA, M. T.
Some observations on the prevention of the natural coagulation of Ceylon latex with special reference to crepe manufacture.
Quart. Circ. Ceylon Rubb. Res. Inst., 1954, **30**: 35-43, bibl. 32.

l RODMAN, L. E.
Diagonal ploughing.
Cane Grs' quart. Bull., 1955, **18**: 88, illus.
Advocated for ploughing out old cane stubble.

m SINGH, S. N., AND PANDEY, S. D.
Abnormal specimens of *Psidium*.
Indian J. Hort., 1954, **11**: 61-2, illus.
Guava seedlings with abnormal leaves described.

n SPOON, W.
Verpakking van de China-banaan in papier. **(Paper packing for the Cavendish banana.)** [English summary ½ p.]
Landb. Tijdschr., 1955, **67**: 67-73, bibl. 13, illus.
Method used in French West Africa described.

o STORY, C. G.
Q.58.
Cane Grs' quart. Bull., 1955, **19**: 79-81, illus.
Characteristics and performance of this new cane variety.

p TROJER, H.
El ambiente climatológico y el cultivo del cafe en Colombia. **(The climate and coffee growing in Colombia.)**
Bol. inf. Colombia, 1954, **5** (57): 22-36, bibl. 6.

q URQUHART, D. H., AND ROSS WOOD, G. A.
The cocoa industry of Bahia in Brazil.
World Crops, 1955, **7**: 97-101, illus.

r VENKATARAMANI, K. S.
Notes on some common crotalarias. III. *Crotalaria striata.*
Plant. Chron., 1954, **49**: 568-70, illus.

s WADSWORTH, R. V.
The quality of raw cocoa as it affects the manufacturer.
Trop. Agriculture, Trin., 1955, **32**: 1-9.

t WELLMAN, F. L.
Evidencia de resistencia a las enfermedades en los cafetos. **(Evidence of resistance to coffee diseases.)**
Turrialba, 1954, **4**: 52-7, bibl. 22.
A review.

u WILSON, T. B.
The marketing of durian fruit from Parit District, Perak.
Malay. agric. J., 1954, **37**: 211-17.
Including notes on the tree and yields.

v WRAY, G.
Algunos aspectos ecológicos del cultivo del cacao en el Ecuador. **(Some ecological aspects of cacao growing in Ecuador.)**
[Proc.] V Reunión Com. téc. interamer. Cacao 1954, Vol. **2**, pp. 18.
Much suitable land still available.

w YOUNG, H. E.
Crown budding for oidium resistance.
Adv. Circ. Rubb. Res. Inst. Ceylon **32**, revised 1954, pp. 4, illus.
Using the resistant LCB. 870 as crowns.

x YOUNG, H. E.
Ustilina rot of rubber trees.
Adv. Circ. Rubb. Res. Inst. Ceylon **47**, 1954, pp. 2.
Ustulina deusta and its control.

NOTES ON BOOKS AND REPORTS.

Books.

2262. BLACKMAN, F. F.
Analytic studies in plant respiration.
Cambridge University Press, 1954, 10½ × 7 in., pp. ix + 231, 40s.

This is a dangerous book in the sense that its import can easily be misunderstood and its lessons misapplied. It consists of nine papers arising from experiments carried out on twenty-one apples kept in a cold store, and the papers are the result of a great mind determined to find the lessons to be drawn from the varied results obtained from the individual apples.

To a biologist trained in the use of statistical methods, the approach to an understanding of the problems of plant metabolism that is illustrated here is disturbing. The language leaves nothing to be desired, the papers are clarity itself, and yet, so closely are argument and experiment intermingled, it needs a mind the equal of Professor Blackman's to appreciate the value of the conclusions drawn. Nevertheless, the attitude of mind to the study of biological data that illumines this series of papers is worth serious study by all who call themselves physiologists. The statistician may look for an error term, Professor Blackman goes deeper and seeks the reason and cause of the statistician's "error", and in doing so extracts conclusions which a purely statistical treatment would have missed.

If the result of reading this book is to reduce the number of papers published which describe results and increase the number that explain results, then all physiologists will be for ever grateful to Dr. J. Barker for preparing the work for publication and to Professor G. E. Briggs for his preface. F.W.M.L.

2263. BOURIQUET, G., AND OTHERS.
Le vanillier et la vanille dans le monde. **(The vanilla plant and vanilla throughout the world.)**
Éditions Paul Lechevalier, 12 rue de Tournon, Paris (VI^{e}), 1954, 10 × 6½ in., pp. 748, bibls numerous, figs 224, plts 21, 15,000 francs.

The genus *Vanilla* is unique among the immense numbers of orchids in containing species of economic, as distinct from horticultural, importance. In spite of the large-scale manufacture of vanillin, the essential flavouring matter of the vanilla plant, there is still an extensive demand for the natural product for certain purposes, and consequently the book here reviewed is of considerable importance. It is the first attempt to gather together in one account all the known information bearing on the cultivated vanillas and indeed on the whole genus. Dr. Bouriquet, who contributes a large part of the book himself, has drawn on the knowledge of a large team of specialists who each deal with the aspects of the subject on which he or she is specially qualified to write. Botanists, Agriculturists, Chemists and Economists all combine to present a complete and many-sided picture of the activities associated with *Vanilla* from the germination of the seed to the production of the vanilla essence.

Although the greatest emphasis is placed on the cultivated vanillas of importance (*Vanilla fragrans*, *V. pompona*, *V. tahitensis*) the book covers the whole genus so far as is possible. Introductory chapters deal with the caryology and anatomy of the genus, with special reference to the cultivated species. An important section which follows, by Professor R. Portères, deals with the classification and distribution of the 110 species of the genus, and occupies about 200 pages in all. This includes a number of maps showing the distributions of almost all the species, arranged in groups of allied species, an extensive and detailed key for the determination of all the species, and descriptions of these with comments. Over 40 excellent line drawings illustrate a large proportion of the species recognized, the specimens seen are cited and a complete synonymy is provided. Although the opinions and decisions expressed in this account are not all accepted by the reviewer, there is no doubt that the bringing together of all the known information about the classification of the group is an important contribution to our knowledge.

Dr. H. Stéhlé, in discussing the ecology of the genus, emphasizes the importance to cultivators of understanding thoroughly the habitats in which the species grow naturally. He describes these fully and points out the relationship between the conditions there and those in the main vanilla-growing areas. These latter are dealt with seriatim and their main ecological features pointed out and discussed.

Two important chapters, both by Dr. Bouriquet, deal with germination of the seeds and the cultivation of the vines themselves. The latter section covers such subjects as preparation of the soil, choice of supporting and shelter plants, artificial multiplication and planting, mulching, manuring, artificial pollination, irrigation, etc., and gives a clear and complete account of cultural methods and procedure. Like the rest of the book it is fully illustrated.

Other chapters are concerned with fungal and animal pests, drying and conditioning of the fruits after gathering, the chemistry of the vanilla essences and the deterioration of stored fruits. Each chapter or section is provided with a very adequate bibliography, while there is an additional bibliography of over 250 references at the end of the book. Over 200 illustrations, including several coloured plates, add to the value of the text, though the reproduction of some of these is not very satisfactory.

Altogether Dr. Bouriquet and his collaborators must be congratulated on the production of a most valuable book of reference to all aspects of the study of this interesting genus. V.S.S.

2264. Champagnat, P., (and Bagenal, N. B., Translator and Editor).
The pruning of fruit trees.
Crosby Lockwood, London, 1954, 9 × 5½ in., pp. 166, illus., 12s. 6d.

This manual by a member of the Botanical Institute, Strasbourg, as translated and edited, comprises ten chapters beginning with the life history of the fruit tree and a discussion of pruning in general, and then describing the main pruning techniques used in shaping trees and making them fruitful.

Commercial growers may find that orchard tree pruning receives insufficient space in this book, but the keen amateur will find much to interest him in training trees to artificial forms, and the methods of Lorette, Lepage, and Desbois are examined. Most of the line drawings which illustrate the book are clear and helpful but Fig. 4, illustrating the cutting off of a tree a little above ground level to allow top-grafting, seems rather drastic and one wonders why the next figure, showing heading back, does not suffice. The illustrations on page 18, which show a tree before and after dehorning, are misleading, since the tree has apparently been severely thinned out—not dehorned.

In a book on such a controversial subject it is hardly surprising that a reviewer should question some of the statements made, for example (p. 43), that after the delayed open centre tree is formed it "needs no treatment of spur system afterwards", and some might not agree that it is the long thin fruiting branches that are the ones liable to break under the weight of crop in lightly pruned trees (p. 45). M. Champagnat also considers in detail the arching of laterals on trained tree forms as a method of developing fruit buds and checking their growth in length and *thickness.*

To the experimenter this book is full of stimulating ideas, for instance in the Dalchow process of "reinforcement" it is claimed that by pruning the leader in late summer to 8–10 buds the new terminal bud is strengthened, growing out more strongly the following spring, and that there is better development of the buds below it. Certainly the timing of the pruning operation must be a very critical factor.

It is to be hoped that before long the attempt, recently made in England, to clarify and define pruning terms will be extended to the international field and so aid both readers and translators of these valuable pruning works. A.P.P.

2265. Egyptian Desert Institute and UNESCO.
Proceedings of the symposium on scientific problems of land use in arid regions, Cairo, December 1953.
Costa Tsoumas et Cie, Cairo, 1954, 9½ × 7 in., pp. 222, illus.

This volume contains 13 papers and the resolutions of the Symposium. Amongst the former mention may be made of a paper by Mohammed Drar on economic plants of the Egyptian desert and one by A. Hifny Saber and Shafik I. Balbaa on *Hyoscyamus muticus* [see separate abstracts].

2266. van Eimern, J., Franken, E., and Harries, H.
Ergebnisse von Windschutzuntersuchungen in Hamburg-Garstedt 1952. **(Results of windbreak studies at Hamburg-Garstedt in 1952.)**
Landwirtschaftsverlag G.m.b.H., Hiltrup bei Münster (Westf.), 1954, 8½ × 6 in., pp. 95, bibl. 13, illus.

The scenery in Schleswig-Holstein is largely determined by windbreaks planted on earth banks for the protection of farm crops. Horticulturists interested in the problem of shelter may welcome the mass of meteorological data presented to illustrate the effect of windbreaks on, for instance, wind velocity, evaporation, soil moisture, precipitation, relative humidity, dew and air and soil temperature. The study was carried out by the agrometeorological research section, Hamburg, of the German meteorological service. V.H.G.

2267. FREUDENBERG, G., AND CAESAR, R.
Arzneipflanzen. Anbau und Verwertung.
(Medicinal plants. Their culture and utilization.)
Paul Parey, Berlin and Hamburg, 1954, 8×6½ in., pp. 204, bibl. 110, illus., DM. 16.80.

There is no dearth of books on medicinal plants, but few authors, it is claimed in the introduction, could have combined such intimate practical knowledge of the subject with so long an experience in the breeding of herbs and their industrial utilization. However that may be, the publication of an authoritative work on herb growing in Western Germany is timely, for hitherto the bulk of Germany's home-produced supplies of medicinal plants has come from the East. The emphasis of the new manual is on cultural aspects which are discussed both generally as regards the requirements of the group as a whole and specifically as applied to individual herbs. The latter part, with its 156 pages, constitutes the main body of the book which is divided into 5 sections according to which parts of the plant yield the active substance. Here the culture and harvesting of the forty-odd plants are very fully described and details are given on pharmacological designation, including also English terms, active compounds and yields per unit area. The chapter on utilization also contains much information of direct interest to the grower, especially in its account of drying prior to the delivery of the material to the manufacturer. Managerial and economic problems in the running of herb gardens, whether they represent a side line or the sole crop, and aims in the breeding of medicinal plants—for the benefit of seed producers—are other valuable points discussed. One slight criticism of this commendable book, which could be studied with advantage in any temperate country, is that the photographs add little to the text, though the line drawings are instructive.

V.H.G.

2268. GARRAD, G. H.
A Survey of the Agriculture of Kent.
Being *County Agricultural Survey* **1.**
Royal Agricultural Society of England, 16 Bedford Square, London, 1954, 10×7½ in., pp. 217, bibl. 140, illus., 21s.

This detailed survey of the agriculture of Kent in 1952 and how it has developed is written by one who has spent nearly 40 years working among the farmers of Kent as their friend and expert adviser. He knew or knows the men who through two world wars have guided Kentish agriculture and the facts which have moulded their decisions. He proves a worthy successor to John Boys who wrote on the same theme in 1796, George Buckland in 1845, Whitehead in 1899 and Hall and Russell, who published *The Agriculture and Soils of Kent, Surrey and Sussex* in 1911. His book will delight Kentish Men and Men of Kent alike, sheep farmers, hop farmers, and fruit farmers too, and far beyond Kent those who in Australia, New Zealand or Canada, still spare a thought for their native soil in the south-east corner of England.

To the horticulturist, wherever he may be, it is a soil of no little importance. In 1952 the total acreage under fruit in England and Wales was 309,994, of which Kent contributed 87,547 or 28%. Similar figures for hops show total acreage in England and Wales as 22,099 and in Kent as 12,374 or 56%, and if the acreage under small fruit is only a mere 9,390 or 20·8% that also is not to be despised.

As regards agricultural education and research few other counties, if any, are so well provided. In this book will be found short, extremely interesting accounts of the origin and progress of Wye and Swanley Horticultural Colleges (now combined as one in Wye College), the Kent Farm Institute at Sittingbourne, the Kent Horticultural Institute at Swanley, the County Demonstration Glasshouse Station at Swanley, the East Malling Research Station and the Ditton Laboratory, both at East Malling. The prominent part played by the numerous county agricultural associations is discussed at some length.

Separate sections are devoted to: Size of holdings, rents, water, electricity and labour; geology; farming in different parts of the county; grasslands; hops; fruit; implements and machinery; cattle; sheep; pigs; poultry and bees; markets and fairs; education and research; agricultural organizations; forests and woodland. In addition there are maps, graphs and tables showing the comparative importance of different branches of agriculture in the county.

The book is excellently produced with beautiful illustrations typical of the Kentish scene; it makes exceptionally pleasant reading.

D.A.

2269. HOLLINGSHEAD, R. G. W.
Oxine and its derivatives.
Butterworths Scientific Publications, London, 1954, 10×6 in., Vol. 1, pp. 1-322; Vol. 2, pp. 323-616, 42s. each.

This work is to be published in three volumes of which two have appeared and are reviewed here. The third volume, to be published shortly, will deal with the preparation, properties and applications of derivatives of oxine (a coined name for 8-hydroxyquinoline=8-quinolinol), as well as providing an author index to the whole work.

The first two volumes deal with the preparation and properties of oxine itself (4 chapters), its use for the quantitative estimation of metals (27 chapters) and of phosphate and silica (Chapter 32), and the non-analytical uses of oxine (Chapter 34). There are 5 appendices, including a bibliography of some 50 papers published since the book went to press, and an index to each volume.

The intention is to give as full a picture as possible of all the work published on the chemistry of oxine, and the two volumes should prove an invaluable reference library to the analyst and to others interested in the mechanisms whereby oxine functions in biological systems. Mention is made (p. 584) of the work of Albert and Rubbo and associates on the dependence of oxine, for its anti-bacterial action, upon the presence of traces of metals, especially iron or copper; no reference, however, is made to similar work on *Aspergillus niger* by Anderson and Swaby (*Aust. J. Sci. Res., Ser. B*, 1951, 4: 275-82), although a rather different theory put forward by Vicklund *et al.* for this fungus is referred to on p. 255. It remains to be seen if oxine is truly toxic *per se* to any micro-organism.

Both volumes are printed clearly on good paper, and no errors were detected by the reviewer. Some readers may be irritated by the complete absence of stops after common abbreviations (per cent, g, °C, and the like), but at least this seems to be consistently done.

A.H.M.K.

2270. LOOMIS, W. E., AND OTHERS (AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS).
Growth and differentiation in plants.
The Iowa State College Press, Ames, Iowa, 1953, 9 × 6 in., pp. 458, references numerous, illus., $7.30.

Plant physiologists will be much indebted to the editor and authors of this important monograph. The eighteen chapters, each written by a specialist in his own particular field, are no mere compilations of collected facts; although the historical background is not neglected, the main emphasis is usually on a critical evaluation of recent research and hypotheses. The first chapter, by the editor, W. E. Loomis, fulfils the purpose implied in its title, "Introduction and Summary", by examining the importance and interrelation of the facts and hypotheses discussed more fully in subsequent chapters. In Chapter 2 E. W. Sinnott presents a brief review of factors involved in plant morphogenesis. Chapter 3, by G. Baldovinos de la P., is on the growth of the root tip, and Chapter 4, by J. C. O'Kelly and P. W. Carr, is on the elongation of the cotton fibre; both make valuable new contributions to knowledge. Chapter 5 is a concise review by Katherine Esau of modern views on the anatomical differentiation of shoot and root apices. In the sixth chapter R. E. Buchanan deals briefly with some elementary mathematics of plant growth. Chapter 7, by G. F. Sprague, is on heterosis, and Chapter 8, by N. C. Thornton, on dormancy: both authors emphasize our lack of knowledge on certain aspects of these subjects and the need for further work. Chapter 9 is a concise but comprehensive and critical review by A. W. Naylor of recent work on the reactions of plants to photoperiod and of suggestions as to the mechanisms concerned. In Chapter 10 H. C. Thompson deals with the vernalization of growing plants, with special reference to work on the subject carried out by the author himself or by students under his supervision.

Chapter 11, by W. E. Loomis, is a thoughtful review of the general subject of growth correlations in plants. Chapter 12, by H. F. Rosene and E. J. Lund, reviews the facts and hypotheses concerning bioelectric fields in plants and the part they may possibly play in controlling growth and development. The physiology of hormone action in plants is reviewed by S. A. Gordon in Chapter 13, and in Chapter 14 J. Bonner and J. Liverman examine the question of hormonal control of flower initiation and, like the author of Chapter 9, are mainly concerned with photoperiodic responses. The next two chapters have a more biochemical approach; Chapter 15, by H. S. McKee, is concerned with the structure and synthesis of protoplasm and reviews our knowledge of the chemical structure of the cytoplasmic matrix, the various inclusions within it, and of the synthesis of some of its more important constituents. Chapter 16, by B. Commoner and M. L. Zucker, is on cellular differentiation and describes experimental methods for studying the chemical structure of single differentiated cells. Some factors associated with diseased growth in plants are discussed by A. J. Riker and A. C. Hildebrandt in Chapter 17, with special reference to crown gall development. The 18th and last chapter is by S. H. Hutner and is concerned with the comparative physiology of heterotropic growth in plants, that is, growth for which CO_2 is not the source for carbon; the author is concerned mainly with the higher plants, but he deals also with heterotrophy in flagellates and algae. Most of the chapters have long lists of literature cited, and there is a general subject index. M.C.V.

2271. MCCUBBIN, W. A.
The plant quarantine problem.
Being *Annales Cryptogamici*, Vol. **11.**
Ejnar Munksgaard, Copenhagen, 1954, 9 × 6 in., pp. 255, bibl. 80, kr. 32, $4.80, 33s. 9d.

The sub-title runs "A general review of the biological, legal and administrative and public relations of plant quarantines with special reference to the United States situation". In other words, the author sets out the basic reasons for quarantine, describes its operation and shows how the incidence of disease or pest has been affected by its application in a number of cases, e.g. bulb nematode, chestnut blight, citrus canker, flag smut, phoney peach, etc. In short a most readable account is given of the steps taken in one part of the world by man, the arch predator of nature, against his fellow predators. D.A.

2272. MARSHALL, R. E.
Cherries and cherry products.
Being *Economic Crops*, Vol. **5.**
Interscience Publishers Ltd., New York and London, 1954, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. xiv+283, bibls numerous, illus., $8.50.

This ambitious book, the fifth of a series on "Economic Crops", aims to provide all the information now available on the production and use of cherries in the U.S.A. Its scope may be guessed from the fact that the Table of Contents alone runs to five and a half pages, covering, first the historical, botanical and horticultural aspects of cherry production, and later the chemistry of the fruit, and its handling for various purposes—the fresh fruit market, canning, freezing, brining, etc. As a work of reference it appears to cover the field very comprehensively; and the two indexes, of authors and subjects, seem reasonably adequate.

But any who set out to read the book through may find themselves pulled up sharply by small but irritating errors. In the botanical and horticultural sections, with which the reviewer is more or less familiar, we find over and over again (page 33 ff.) Armarelle for Amarelle; the author seems unable to make up his mind whether Bigarreau has one g or two (on page 29 both spellings occur in successive lines); whilst on page 28 we find Waterloo listed as a "light coloured heart". All these and other mistakes could easily have been corrected from a source much used by the author, *The Cherries of New York*.

In the later sections on the use of the fruit the reviewer has not found so many mistakes; but he feels that may be in part due to his lack of familiarity with the subject. It is to be hoped that if a second edition is called for, a more knowledgeable person may take charge of the proof-reading.

N.H.G.

2273. Merrill, E. D.
The botany of Cook's voyages.
Chron. Bot., 1954, **14** (5/6): 161-384, bibls, illus.

The sub-title runs "and its unexpected significance in relation to anthropology, biogeography and history". The book can be recommended specially to those who are interested in the history and distribution of tropical plants including many valuable crops, annual and perennial.

2274. Pape, H.
Krankheiten und Schädlinge der Zierpflanzen und ihre Bekämpfung. **(Diseases and pests of ornamental plants and their control.)**
Paul Parey, Berlin and Hamburg, 4th edition, revised, enlarged, 1955, 9×6 in., pp. 559, bibls, illus., DM. 53.80.

If ever an encyclopaedia was a substitute for direct expert advice, this is. It deals comprehensively yet concisely, in a scientific yet eminently practical way with the (very) vast majority of troubles, animal, vegetable and mineral, that may befall ornamental plants grown commercially in central Europe. A brief classification of the many causes of trouble is followed by a survey of cultural, mechanical, biological and chemical methods of prevention (stressed throughout) and cure. Names and addresses are given of the manufacturers of all equipment described and pictured. Measures of soil sterilization by steam and seven chemicals are compared. Old-fashioned and therefore thoroughly tested plant protectants are dealt with in detail (thus, hydrocyanic acid fumigation is warmly recommended); recent introductions—unavoidably dating the book—are mentioned more summarily and advocated chiefly where no satisfactory control has previously been known. The list of fungicides includes the thiocarbamates, here recommended against botrytis "fires" and powdery mildews, and ferbam and zineb are singled out for rust control. More recent introductions, including captan, are not included.

The main part of the work, an alphabetical list of decorative plants and their individual troubles, is preceded by a detailed account of non-specific pests and diseases and generally applicable control measures. Reference is made to this section whenever appropriate, but in addition specific suggestions, collected internationally, are made for the majority of plant-parasite combinations. A rigid scheme is used in all cases: Generic and German names; special features, e.g. optimal pH range, susceptibility to certain chemicals; parasitic diseases; pests; viruses (K. M. Smith's classification); other troubles. The diseases and pests are always dealt with under the following headings: German and scientific names; symptoms of damage; identification, including usually life history of the culprit; control measures. Lists of resistant and susceptible varieties are given in many cases. Recommendations are always explicit. There is a plant index and a trouble index, both comprehensive, for names and synonyms in Latin and German.

Publications in many languages are referred to, although unfortunately the authors are not grouped alphabetically, and one misses such names as Gäumann and Bawden. Few readers will have heard of all the measures advocated, e.g. keeping toads in glasshouses to devour insect pests and snails, provision of young specimens of *Datura stramonium* to trap snails, and potato plants to trap capsid bugs; use of copper carbonate sprays against powdery mildews; recipes for home production of wetting agents and stickers; warm-moist-air-treatment against *Tarsonemus pallidus* on cyclamen; gassing narcissus flies with methallyl chloride. There can be few omissions, but even this otherwise thorough author ignores the contribution made by the John Innes composts to glasshouse hygiene. One also misses mention of continuous flow aerosols.

The choice of control measures out of the often bewildering number advocated is generally left to the grower, without any suggestion as to their relative usefulness. This, however, is obviously due to the lack of comparative data and cannot be considered the author's fault. The high price of the book is outweighed many times by its helpfulness. The many excellent illustrations are worthy of special praise. W.H.

2275. Pinkerton, M. H.
Commercial Mushroom Growing.
Ernest Benn, London, 1954, 8½×5½ in., pp. 223, illus., 21s.

Although the list of contents of *Commercial Mushroom Growing* follows a sequence which might be expected in textbooks for beginners, its author rightly warns the amateur reader that he "will not find this one suitable". Indeed it is likely to be read gainfully only by professional growers of long experience.

Mr. Pinkerton draws on his twenty years of successful mushroom culture in specially constructed houses and in caves as a background to his exposition of the theory and practice of growing. Added to this is his experience as one of the few British makers of pure culture mushroom spawn.

The first highlight occurs in Chapter 3 where the meaning of pH is simply and effectively described, but serious concentration is not demanded of the reader until Chapter 4 (Composting). This chapter is dominated by a diagram which shows the distribution of temperature levels in an oblong heap of compost; the resultant types of fermentation are discussed and the value of a prismatic heap deduced. As a corollary, novel ways of reducing the composting time are suggested.

Nine pages are devoted to the "sweat out" which should follow the filling of the beds; directions are given for varying the procedure according to the condition of the compost. The functions of that all-important trinity, temperature, ventilation and moisture, are examined in detail; much good may be done if growers can be induced to control these and "let the pH take care of itself".

The author gives due emphasis to the importance of ensuring that the casing is capable of stimulating sporophore production and he shows pioneering spirit by manuring and otherwise preparing the soil in the field months or even years before it is dug for use. Reference to the now widely used peat and chalk casing is curiously omitted and, in view of recent rumours, readers may well wonder whether this omission was prescient.

Three chapters deal with the prevention and control of diseases and pests; these are packed with information which includes descriptions of commonly used therapeutants. The author is not, however, a slave to chemistry and properly stresses the value of heat as the best agent for disinfection where it can be applied. Much of the information on insects and similar pests is derived from American sources and does not necessarily apply to Britain. Certain of the section headings might disturb the purists and there are also a few mistakes concerning fungicides; the grower should be correspondingly cautious in adopting a recommended treatment.

The book ends with a complete and useful account of the fully mechanized tray culture and this is supported by six line diagrams. Nevertheless, there are a number of growers who will feel that the author has developed an excess of optimism on the virtues of this much discussed, post-war innovation.

No other British textbook on mushroom culture treats the theory and practice in such detail and no professional grower should rest contented until he has a copy at hand for reading and for reference. H.H.G.

2276. RICHARDS, A. A.
Modern Mushroom Cultivation.
Collingridge, London, 1954, 7½×5 in., pp. 96, illus., 8s. 6d.

There could hardly be greater contrast between two textbooks on mushroom growing than between the book now reviewed and *Commercial Mushroom Growing*; indeed, the main feature in common is the year of publication. *Modern Mushroom Cultivation* has been written for the amateur and for the prospective commercial grower, who should certainly study its pages.

The author exudes an air of confidence which is as refreshing as it is rare in mushroom literature. He points out that mushrooms may be grown in structures as diverse as Nissen huts, caves, hen batteries, cellars and bale straw houses as well as outdoors in lawns and in ridge beds made of compost.

Most of the book is devoted to instructions on how to grow mushrooms in a stable manure compost, in a manner which has been successfully practised at Cheshunt Research Station and on numerous commercial holdings during recent years. There are few deviations into experimental methods to puzzle the novice.

Controversy is avoided but there are inevitably items of interest on controversial matters. For instance, the author's experience is that site contamination in wooden shelf beds can be eliminated by treating with creosote a few days before filling. His chosen depth of compost is 8 in., while he finds that casing soil of ½ in. thickness cannot be watered safely, is optimum at 1¼ in., gives spasmodic crops at 2 in. and no crop at 3 in.

Novices should be grateful for the chapter on packing and grading; information on the best methods of handling a mushroom crop is not easy to obtain. On the other hand, they should not expect to repeat the success obtained by the author in his first trial with live steam at peak heat; other growers have found saturated compost after their first attempt.

The book ends with a chapter on pests and diseases and this gives an adequate introduction to the major problems likely to be met without being sinister enough to frighten away the adventurer into mushroom cultivation. Among the 35 excellent photographs is one (facing page 93) labelled "Damage caused by mushroom mites". Surely fly larvae are the culprits. H.H.G.

2277. RIEGER, R., AND MICHAELIS, A. (STUBBE, H., editor).
Genetisches und cytogenetisches Wörterbuch.
(Dictionary of genetics and cytogenetics.)
Züchter, Sonderheft 2, Springer-Verlag, Berlin, Göttingen, Heidelberg, 1954, 11½× 8 in., pp. 140, bibl. pp. 7½, DM. 23.50 (for subscribers to *Züchter* DM. 18.80).

The authors define 2,500 English and German terms, in German, and by commenting on them, often at length, elevate the dictionary to an encyclopaedia of genetics and cytogenetics. Where possible a reference is given to the author who coined the term or to a relevant paper. A lengthy bibliography concludes this valuable publication.

2278. ROSE, G. J.
Crop protection.
Leonard Hill, London, 1955, 8½×6 in., pp. xxi+223, illus., 30s.

There is much to commend this book, almost the first on this subject to appear in Britain for fifteen years. It is concerned with chemical measures for protection, but the author recognizes that other methods exist and are preferable under certain circumstances; the Introduction, in fact, sets chemical control in its right perspective.

There are four Sections, devoted respectively to formulations, pesticides (herbicides, insecticides, fungicides and rodenticides), application machinery, and (a mere four pages) stored products. Of thirteen chapters, two hardly merit separation from their neighbours. There is a Summary of Control Measures, and an Appendix containing thirteen tables of mensuration data and conversion factors, the latter being given to far too many digits in the absence of temperature corrections. The Index, while good, does not deserve the title "Comprehensive Index" given it in the Contents.

The colour plates were obtained from a German company and are distinctly inferior to studies of this type by at least one British counterpart. There are many excellent black-and-white plates, and also diagrams, but the collections of components in Figs. 43 and 50 do not constitute "exploded" views. The author introduces an interesting distinction between "wettable powder" and "water-dispersible powder", the latter remaining in suspension without agitation. While the latter is clearly superior to the former, especially for knapsacks and the like, it is only a special case of the former; it is almost impossible to draw the line between them, and the distinction is unlikely to become widely accepted.

The Section on machinery is extensive and well illustrated, and will be of great value to all concerned with crop protection. It covers application by dusting as well as high and low volume spraying, and ranges from the simplest apparatus to power-driven machines and even aircraft equipment.

It is, therefore, the more unfortunate that the Section on chemicals should have so many errors in it. The author (p. 52) states that official bodies have tried to give short names to the active ingredients of pesticides, but shows no knowledge of the British Standard 1831, of which Part 1 appeared in 1952 and Part 2 in 1953. As a result, there is no distinction between "officially recommended common names", which have small initial letters except where they consist of initials, and short names given by manufacturers. Moreover, full stops are used every time for DDT, BHC, DNC, MCPA, etc. Recommended common names such as dinoseb and propham do not appear at all. American influence is shown in "sulfamate" and "fluosilicate", and by the use of the abominable term "miticide". Even more disturbing is the absence of reference to Ministry publications. Thus there is no reference to the fact that clothing for workers spraying DNC is governed by regulations, nor are the M.A.F. recommendations given for control of pests, e.g. fruit tree red spider mite by 3% petroleum oil as a late dormancy spray. There is, apparently, complete confusion of the two mite summer ovicides, 4-chlorophenyl benzenesulphonate (CPBS, fensone) and 4-chlorphenyl 4-chlorbenzenesulphonate (CPCBS, chlorfensone). Ziram is the zinc analogue of ferbam, but belongs to a different series from zineb.

Nevertheless, these faults are but blemishes on a work of real value, and no doubt will be corrected for the next edition. It would probably be as well to cut out the "Summary of Control Measures", because it is doubtful if a collection of measures from all over the world is of any value unless it is made clear where they were successful. Would it not be better to confine a British book to British problems and British solutions? The task of writing a handbook for the world, or even British overseas territories, is beyond anyone in a few hundred pages. A.H.M.K.

2279. Searle, S. A. (Editor).
Plant climate and irrigation.
Chichester Press, Chichester, 1954, 9×5½ in., pp. 154, bibls, illus., 20s.

This book can be confidently recommended to those who wish to understand plant climate and how it can be influenced by appropriate and accurate irrigation to assist optimum growth in the glasshouse. It deals with both theory and practice. Chapter headings are: Plant climate; Environmental factors in the glasshouse; Growing in a microclimate (by F. R. Frampton); Measurement of soil moisture (electrically by B. A. Eastwell and with tensiometers by Searle); Calculation of crop water requirement; Effects of different water regimes on the growth and yield of tomatoes (a valuable account of recent work at Nottingham University by P. J. Salter—see also *H.A.*, 25: 653); and Application to commercial growing. Whether the normal tomato grower under glass is aware of all the valuable facts enunciated in this book is doubtful. That he would gain in outlook and find the means to produce more efficiently if he absorbed the contents seems certain.
D.A.

2280. Small, J.
Modern aspects of pH.
Baillière, Tindall & Cox, London, 1954, 8½×5½ in., pp. 247, bibl. ca. 360, £1.

Written with special reference to plants and soils this modestly priced book by the Professor of Botany of Queen's University, Belfast, will commend itself to workers in a much wider field than that of botany. Horticultural workers will welcome in particular the chapters on pH and cell sap, plant hormones and pH, enzymes and pH, and pH and succulents. Even complete laymen will find it fascinating reading.

2281. Smith, T., and Rhodes, J.
The profitable culture of vegetables.
Longmans, Green & Co., London, New York, Toronto, 3rd edition, 1954, 9×6 in., pp. 318, bibls, illus., 25s.

This book was first published some years ago, in point of fact before the First World War, and its second edition appeared in 1937. As late as 1950 the original author was honoured by the Royal Horticultural Society for his help in the advancement of horticulture, in particular by the issue of this book, which has now served several generations of gardeners.

While fundamentals stay put, however, technique changes and the present editor, a Provincial Horticultural Advisory Officer in the N.A.A.S., has seen to the provision of information on modern introductions. Other experts have been called in on the pest and disease side. One feature of the first edition, the section on French Gardening, is retained in somewhat abbreviated form—21 pages—and a new chapter deals in 10 pages with modern intensive cultivation with the aid of dutch lights and continuous cloches.

The work is in 3 parts. The first concerns general problems such as those of site, disposal of produce, soils, rotations, devices for forcing and protecting, implements, etc., and contains rather short but useful chapters on weeds and irrigation. In the second instructions are given on the cultivation of all the ordinary vegetables grown in the United Kingdom and in the third notes are given on incidence and control of common pests and diseases. Each chapter ends with suggestions for further reading on particular subjects.

It is a practical book for practical people based on experience and scientific advance. D.A.

2282. Tukey, H. B. (Editor).
Plant regulators in agriculture.
John Wiley & Sons, Inc., New York, and Chapman & Hall Ltd., London, 1954, 9×6 in., pp. x+269, bibls, illus., 44s.

This book is addressed to all interested in the manifold effects of plant growth substances, and has been written by a team of specialists. The earlier chapters are introductory; H. B. Tukey, the editor, sketches the history of plant hormones, then with C. L. Hamner outlines the processes of growth and the mode of action of the regulators leading to a description of their chemical nature by A. G. Norman. The excursion proper begins appropriately with an account by V. T. Stoutemyer of the initial use of regulators to encourage root-formation by cuttings. He succeeds in giving a balanced presentation and rightly emphasizes the importance of considering their effect relative to other factors.

The next five contributions (Chapters 5–9) describe the scope for regulating the flowering and fruiting of plants. S. H. Wittwer deals with the induction of flowering and the setting of fruit, his examples including the great sensitiveness of the pineapple plant, the control of "bolting" in vegetable crops, and fruit set in tomato and bean. L. C. Luckwill, lone Englishman in an otherwise American team, considers the hormonal control of fruit development, and the facility with which the growth substance may stimulate such development, especially in the absence of seeds (parthenocarpy), with reference to apples, strawberries, citrus, grapes and other fruits. F. T. Addicott discusses abscission whereby the plant actively sheds its parts, growth substances being required either to retard such shedding, e.g. leaves of brassicas in store or young fruits of apple, or to exert the opposite effect, e.g. defoliation in cotton or nursery stock. L. P. Batjer likewise considers contrary abscission effects, the thinning of blossoms and very young fruits, and the reduction of preharvest drop of mature fruit; and finally W. S. Stuart describes the effect of treatment on the ripening of fruit, including post-harvest application. Here perhaps should have come S. L. Emsweller's short chapter on the value of regulators to the plant breeder in improving the set of fruit and overcoming incompatibility.

In Chapter 10 O. Smith discusses bud inhibition, including the retardation of sprouting in store of potatoes, carrots and turnips, this leading on to a group of chapters on the herbicidal effect of growth substances, their selective action making possible weed control among other plants. R. F. Carlson and J. E. Moulton consider their use in lawns, gardens, orchards and nurseries; C. J. Willard in field crops; J. van Overbeek in tropical climates; and K. C. Barrons on non-crop lands such as railways, roadsides and waterways. Finally A. E. Mitchell describes the methods and equipment for applying growth regulators.

As a whole the book has not achieved real unity, and while some chapters read well, others have not departed from the language of research report and review. There is much repetition (as the frequent editorial cross-references emphasize) and differing frequencies of reference to original research, on the whole some 250 citations being excessive for its purpose. There is lack of uniformity, too, in referring to the growth regulators themselves, and more use could have been made of the table of commonly used abbreviations on page 41. Another general criticism is that insufficient distinction in terms of reliability has been made between the various effects, and the editor implicitly acknowledges this in the last paragraph of his preface. But if the final product is not perfect, this book will help many to dispel the broad mystery of growth regulators and to use them with greater discretion.

E.S.J.H.

2283. Urquhart, D. H.
Cocoa.
Longmans, Green & Co., London, New York, Toronto, 1955, 9×5½ in., pp. xix+230, bibls, illus., 35s.

Cocoa is the second of a series of books on tropical agriculture which is being published with the active encouragement of the Colonial Advisory Council of Agriculture, Animal Health and Forestry under the editorship of Sir Harold Tempany. In assigning the authorship to Mr. D. H. Urquhart the editor made the obvious choice, since among present-day cocoa experts there can be no man with such a wide general knowledge of methods of cultivation in different regions, the practical application of research and the requirements of the manufacturers. Additional contributions have been made by other acknowledged experts in specialist fields, notably Professors R. E. D. Baker, F. Hardy and C. Y. Shephard of the Imperial College of Tropical Agriculture, Trinidad, who have written chapters on Botany, Soils and Rehabilitation, respectively, and Dr. A. F. Posnette, formerly of W.A.C.R.I., who has given an account of Virus Diseases.

Having listed such a cast it would require much boldness on the part of the reviewer to say that he did not like the play. Fortunately this is not necessary, because in so far as the book is intended as a practical guide for cocoa planters it could hardly be bettered. Clearly and simply written and lavishly illustrated it tells the reader of the more important features associated with botany, climate, soils, the establishment of plantations, vegetative propagation, planting and after-care, the preparation of the crop for market, pests and diseases, and cocoa grades and grading. Additional chapters are provided on the methods and problems of peasant cocoa cultivation in West Africa, the procedure advocated for rehabilitating old cocoa plantations in Trinidad, world production and consumption, and, very briefly, the history and present organization of research. Most chapters end with a selected list of references. There are seven appendixes, amongst which mention may be made of one dealing with costs of cocoa culture on estates and peasant farms, and another which reproduces the paper by Wadsworth and Howat on methods of fermenting small quantities of beans [see *H.A.*, 24: 4306]. An adequate subject index is provided.

In a foreword Sir Geoffrey Clay describes the publication of this book as timely. This is an understatement, for the cocoa planter has been without an authoritative, up-to-date handbook for about 20 years. In the past decade in particular demand has outstripped production and in consequence prices of raw cocoa have reached excessively high levels. This has happened, despite marked progress in research, partly because of the spread of disease and partly because of an apparent reluctance on the part of planters in comparatively disease-free areas to venture into cocoa growing or to increase existing acreages. It is to be hoped that this book will encourage the waverers in regions with suitable climatic and soil conditions and will enable them to start operations on the solid foundation of experience accumulated throughout the tropics. It should also help the research worker to fit his investigations into the general picture and perhaps to appreciate better some of the gaps still existing in basic knowledge, as for example the unresolved controversy on spacing in relation to soil fertility and the lack of information on soil conservation measures best adapted to the semi-forest conditions found in cocoa plantations.

In future editions one or two minor editorial anomalies might perhaps receive attention. Thus the main groups of cocoas, Criollos, Forasteros and Trinitarios, are defined, but the connexion between these and such varieties or types as Amelonado, referred to subsequently in the text, and Angoleta and Calabacillo which appear only in illustrations, is not clarified.

G.K.A.

2284. Vogt, E., and others.
Weinbau. Ein Lehr- und Handbuch für Winzer und Weinbauschüler. **(Viticulture. A text- and handbook for growers and students.)**
Eugen Ulmer, Stuttgart (at present Ludwigsburg), 2nd edition, 1954, 8×6½ in., pp. 272, illus., DM. 8.–.

This manual, written by the Director of the Viticultural Institute at Freiburg i. Br. with the help of 8 experts, is good value for money. Its thorough and competent treatment of modern viticultural practices under German conditions is enhanced by a large number of helpful illustrations. Wine making is omitted. The appearance of a revised edition 4 years after publication of he first suggests that the book has met the needs of students and growers alike. V.H.G.

2285. Zander, R.
Handwörterbuch der Pflanzennamen und ihre Erklärungen. **(A dictionary of plant names and their derivations.)**
Eugen Ulmer, Stuttgart (at present Ludwigsburg), 7th revised edition, 1954, 7×4½ in., pp. 512, bibl. 19, DM. 11.60.

This new edition of the "Zander", for long the standard work on plant names in German gardening circles, has been revised according to the rules on nomenclature adopted in Stockholm (1950), London (1951 and 1952) and Paris (1954). Its main features are a list of genera, species and subspecies with name of family, German common name and symbols denoting certain characters in the case of cultivated plants, a list of German common names, an interesting section on etymological derivations, and a list of systematic botanists and plant collectors with short bibliographies.

It is easy to see why this concise and comprehensive book has had a wide appeal in Germany, but its value for the English reader will probably lie mainly in the 326 pages of the plant name alphabet. This, naturally, includes many more economic plants from temperate regions than from the tropics, but we wonder whether the omission of such genera as *Cinchona*, *Hevea* and *Litchi* is justifiable. In other genera the choice of species seems too restricted, as for instance in the case of *Annona* and *Eugenia* where *cherimola* and *aromatica* respectively are not mentioned, or in the case of *Saccharum* where only one species is listed. However, these are only small blemishes, for the book was not compiled for the planter in the tropics. V.H.G.

Annuals and reports.

2286. British Honduras.
Annual Report of the Agriculture Department, British Honduras, for the year 1953,
[1954], pp. 35.

Research included a kidney bean uniformity trial, sugar cane variety and manurial trials, coconut fertilizer trials and ramie fertilizer and herbicide trials. Tobacco trials are projected.

2287. Canada, Minister of Agriculture.
Report of the Minister of Agriculture for Canada for the year ended March 31, 1954,
1954, pp. 151, 50 c.

Science Service: diseases and pests of tobacco, hops, vegetables, tree and small fruits, and ornamentals; herbicides, fungicides and insecticides; miscellaneous insects and nematodes; plant inspection. *Experimental Farms Service:* agriculture; horticulture (new cherry variety, apple rootstocks, strawberry virus diseases, tomato and melon varieties, fruit and vegetable storage and processing); tobacco. Publications are also listed. [See also separate abstracts.]

2288. Cawthron Institute.
Annual Report Cawthron Institute, New Zealand, 1953-54, Nelson, N.Z., pp. 42, illus.

Short accounts deal with: work on trace element deficiencies in raspberries, apples, tobacco and hops, distribution of boron in the hop plant; control of black rot in tobacco seedling beds by chlorobromopropene and dithane D.14; resistance of tobacco to *Verticillium* and *Phytophthora*; chemical composition of the tobacco plant as affected by fertilizers; resins and sugars in hops; manuring in hops; black root rot and verticillium wilt in hops; sterilization of glasshouse tomato soil; use of compost to increase yields; reduction of "cloud" by fertilizer additions. The opening of the Marsden Research Farm at Wakefield [S.W. of Nelson], was one of the features of the year. Detailed experimental work has begun there on the manuring of raspberries and hops.

2289. Charlottetown.
Progress Report Dominion Experimental Station Charlottetown, P.E.I., 1948-1952,
1954, pp. 57, illus.

Horticulture (pp. 40-6). *Pickling cucumbers:* highest yields of good grades were obtained by applying 10 tons of manure broadcast and 10 tons in the furrow; artificial fertilizers used alone gave lower yields than fertilizer plus manure; the optimum spacing was 6 ft. between rows and 1 ft. between plants. *Vegetables:* varieties are recommended for beans, beets, cabbages, carrots, cauliflowers, celery, chard, cucumbers, lettuce, onions, parsley, parsnips, peas, peppers, radishes, rhubarb, spinach, squash, pumpkins and tomatoes. *Weed control:* in beans, beets and peas granular cyanamide was most satisfactory at 400 lb. per acre. *Fruit:* recommended varieties of apples, crab apples, pears, plums, cherries, raspberries, strawberries, currants, grapes and gooseberries; upland cranberries may be cheaply established by sowing oats, causing the sod to rot, and then broadcasting chopped vines. *Ornamentals:* dahlia variety collection.

2290. C.P.V. Experiment Station.
Annual Report 1952 of the Experiment Stations of the Centrale Proefstations Verenigning [in English], cyclostyled, pp. 70.

Information is given on anatomical and physiological studies on hevea, coffee, tea and cinchona; genetical studies on hevea, tea, cinchona and tobacco; plant protection of hevea, coffee, tea, cinchona and tobacco; and cultural trials with hevea, tea, cinchona and tobacco.

2291. Directie van de Landbouw, The Hague.
Tuinbouwgids 1953. **(Horticultural guide 1953.)**
The Hague, Holland, 1952, 9×6 in., pp. 651, illus., fl. 5 or 7 depending on binding.

This tenth edition of The Netherlands Horticultural Guide includes coloured plates of disease and pest injury to cabbages, beans, apples, narcissi, rhododendrons and roses, and of virus diseases of chrysanthemums. A glossary of horticultural terms is given in Dutch, English, German, Swedish and French.

2292. DIRECTIE VAN DE LANDBOUW, THE HAGUE.
Tuinbouwgids 1954. (**Horticultural guide 1954.**)
The Hague, Holland, 1953, 9×6 in., pp. 704, illus., fl. 5 or 6 depending on binding.

This annual collection of up-to-date information for advisory officers and practical horticulturists continues on the same lines as in the past. Coloured plates are included on storage disorders of apples and pears, and on symptoms of diseases, disorders and pest injuries of tomatoes, apples, grapes, hyacinths, azaleas, rhododendrons and roses.

2293. FLORIDA.
Annual Report of Florida Agricultural Experiment Stations for the year ending June 30, 1953, pp. 354, illus.

The scope of this report is similar to that of the 1951/52 report [see *H.A.*, 24: 2101]. The principal crops again include citrus, avocadoes, mangoes, tung, pecans, strawberries, grapes, sugar cane, tobacco, tomatoes, watermelons, celery, cabbage, lettuce, camellias and gladioli. [Separate abstracts of several items will be found in the appropriate sections of this number.]

2294. FREDERICTON.
Progress Report Dominion Experimental Station Fredericton, N.B., 1948-1952, 1954, pp. 46, illus.

Horticulture (pp. 24-35). *Apples:* variety trials; breeding, especially for a late keeping variety; the hardy stocks Antonovka, Hibernal and Anaros are recommended as tree-builders to overcome winter injury; mulching trials with Cortland trees showed that softwood shavings were as useful as oat straw, but that sawdust mulch was only slightly better than no mulch. *Strawberries:* breeding. *Vegetables:* variety trials with beans, tomatoes, cucumbers and peas. *Weed control:* 2,4-D applied to newly planted strawberries aided the control of lambs' quarter, chickweed, shepherds' purse, purslane, barn grass and couch; Dow general, Dow selective, Premerge and CMU, used pre-emergence, gave promising weed control in peas and beans.

2295. GOLD COAST.
Report of the Department of Agriculture, Gold Coast, for the year 1952-53, 1954, Accra, pp. 28, 2s. 6d.

Cacao. Research on the possibilities of the systemic insecticide hanane as an aid to the control of swollen shoot disease. *Other crops.* Citrus, coconuts, oil palms, pineapples, sugar cane, tobacco. *Weed control. Imperata cylindrica* effectively controlled by a pigeon pea fallow.

2296. INDIAN AGRICULTURAL RESEARCH INSTITUTE, NEW DELHI.
Scientific Reports of the Indian Agricultural Research Institute for the year ended 30th June, 1953, 1954, pp. 114.

The following are among many activities briefly described: *Agronomy.* Cane: cultural-varietal-manurial and irrigation trials. Pea: fertilizer trial. Chilli: varietal trial. *Botany.* Breeding of safflower, chilli, *Nicotiana rustica* and tomato. *Soil Science and Agricultural Chemistry.* Soil conditioner tests. Oilseeds: rapid determination of yield and iodine value of oil. Mango kernels: amino acid determination and starch manufacture. Tomato: vitamin C content. Quantitative estimation of nicotine by absorption spectroscopy. *Entomology.* Studies on *Lestrodryinus pyrillae* and *Bracon gelechiae*, parasites or potential parasites of sugar cane pests and on persistence of insecticide residues on sugar cane. *Mycology and Plant Pathology.* Sugar cane red rot and smut. Antibiotic from *Bacillus subtilis* with inhibiting effects on *Alternaria solani* and on the mosaic viruses of *Vinca rosea*, petunia and chilli. Study on *Fusarium solani* and *F. fructigenum. Xanthomonas* sp. nov. from pomegranate leaves. Virus diseases of bottle-gourd, tomato, chilli, pumpkin, radish, cardamom and mango.

2297. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.
Jaarverslag 1953, Instituut voor Tuinbouwtechniek, Wageningen. (**Annual Report for 1953 of the Institute of Horticultural Engineering, Wageningen),** pp. 48, illus.

The following experimental results are included: There was little difference in light intensity under normal and hammered glass, but lettuce growth was better under the latter. Glasshouses were 10–20% lighter and had a higher maximum temperature than dutch light structures, while humidity and average night temperature were similar. Roof fan-ventilators produced a more even temperature in glasshouses, especially in those with high placement of heating pipes. Early growth of tomatoes (Moneymaker) was better under the more even heating conditions given by warm water or thin pipes than by air, or low pressure steam, heating; heating by the thin pipe system also gave earlier flowering and higher yields. Bulk storage gave as good results as box storage with planting onions. Root growth of begonias and poinsettias was better in clay than in Laxa paper pots. Blondine lettuce was earliest and heaviest when irrigated with large droplets, Wonder van Voorburg was heaviest after irrigation with medium-sized droplets, and Amsterdam forcing carrots were heaviest after irrigation with large and medium droplets. Deutsch Evern strawberries were forced most satisfactorily in October, 1953, by supplementary lighting under the ridge of the frames.

2298. IOWA.
Your Division of Agriculture reports, being ***Annual Report of the Division of Agriculture of Iowa State College for 1953-54,*** pp. 58, illus.

This popularly written report includes information on rose varieties for Iowa, the new B2215 onion, weed control in vines, deciduous fruits and vegetables, increase in winter squash yields through insecticidal spraying, partial fireblight resistance in the Sharon apple, new canning tomato varieties, vegetable manuring, soil sterilization before sowing lawn grasses to improve turf quality, and lawn grass species and variety tests.

2299. Lausanne (Gallay, R.).
Stations fédérales d'essais agricoles, Lausanne, sous-stations en Valais et au Tessin, domaines à Caudoz (Pully), Changins (Nyon), La Frêtaz (Bullet). Rapport d'activité 1953. **(Annual Report of the Swiss Agricultural Research Stations at Lausanne, with sub-stations in Valais and Tessin, and at Pully and Nyon.)**
Landw. Jb. Schweiz, 1954, 3 (n.s.): 776-1047, bibls, illus.

The work at Mont-Calme and Montagibert was regrouped, and some sections moved to the Domaine de Changins (Nyon). A new sub-station was opened n Tessin, and is associated with Lausanne in its work on viticulture, horticulture and tobacco. Part I of the report is on general administration and current work. The latter is dealt with under the following headings: *Plant improvement:* tobacco varieties, pome and stone fruit varieties and rootstocks, market garden crops, techniques of vine and fruit growing, weed control. *Inspection:* of seeds and propagating material, fertilizers, and plant protection materials. *Pests and diseases:* San José scale, Mediterranean fruit fly, strawberry virus. Part II contains original articles, 6 of which have been separately abstracted.

2300. Malaya Department of Agriculture (Voelcker, O. J.).
Annual Report of the Malaya Department of Agriculture for the year 1953, 1954, pp. 60, illus., 4s. 8d.

Oil palm: Breeding and selection of dumpy and deli × pisifera; bronzing, which embraces yellowing associated with low leaf Mg and orange spotting associated with low leaf K. *Pineapple:* Breeding and selection; broken core in relation to decrowning. *Cacao:* Selection; control of *Apogonia* sp. *Tea:* Fermentation and copper status. *Ramie:* Clonal trial. *Manila hemp:* Varietal resistance to disease. *Tomato: Phytophthora infestans* control. *Onion: Dizygomyza cepae* control. *Cloves:* Pest control.

2301. Mauritius.
Annual Report of the Mauritius Department of Agriculture for 1953, 1954, pp. 64, R. 1.

Investigations are reported on various crops, including sugar cane, *Furcraea* (varieties, spacing, cover crops and decortication), tea, *Phormium tenax*, vegetable seed production, and tobacco varieties and rotations.

2302. Queensland.
Annual Report of the Department of Agriculture and Stock for the year 1953-54, 1954, pp. 109, illus.

Crops being investigated include: *Agriculture Branch* Tobacco, onions, tea. *Horticulture Branch.* Pineapples, bananas, citrus, deciduous fruits, grapes, mangoes, avocadoes, macadamia nuts, passion fruits, figs, vegetables, tropical crops (coffee, pepper). Other aspects of research include: *Science Branch.* Botany, entomology, pathology. *Chemical Laboratory.* Plant nutrition, insecticide testing.

2303. Saanichton.
Progress Report Dominion Experimental Station, Saanichton, British Columbia, 1947-1953, 1954, pp. 51, illus.

The Experimental Station serves the interests of the farmers on Vancouver Island, where the average holding is small but types of farming are diverse. *Fruits:* recommended varieties of apple, cherry, pear, plum, peach, filbert, blueberry, bramble, currant, gooseberry, grape, raspberry and strawberry are given; there are also trials on apple rootstocks, scab control on pears and strawberry breeding for red-core resistance. *Bulbs:* variety trials with tulip, narcissus, iris, hyacinth and gladiolus; successful and uniform flowering with B.C. bulbs of William Pitt tulips in the greenhouse was obtained by pre-cooling at 48° F. for 1 month starting in August, rooting at 48° F., holding at 63° F. until growth started, then at 68–75° F. until the buds coloured, after which the temperature was lowered to 63° F. *Heating greenhouses with electricity:* 4 watts per cu. ft. were needed to keep the greenhouse temperature at 60° F. under Saanichton conditions. *Holly:* satisfactory propagation was obtained by taking 6-in. cuttings of current season's terminal growth between August and March, leaving on the top 2–4 leaves; IBA at 50 p.p.m. hastened rooting; sand or sand + sphagnum was a satisfactory rooting medium. *Vegetables:* foundation seed production of beans, cabbage, cauliflower, cucumber, leek, lettuce, onion, pea, radish, spinach, squash, tomato, turnip and watermelon. *Weed control* in vegetables was obtained using stove oil pre-emergence, CMU, IPC, CIPC and dinitro compounds in autumn, and 2,4-D plus 2,4,5-T along fences and roads. *Plant nutrition:* strawberry plant deterioration may be caused by high nematode infestation; sawdust mulches have increased vigour and yield of strawberries, loganberries, cherries, and pears; sod mulch reduced vegetative vigour of pears; sawdust mulch increased the number of grade 1 tulip bulbs, and the total weight of tulip and iris bulbs; yields of spinach, carrots and tomatoes were improved by sawdust incorporation and mulching in a rotation; irrigation during the summer months increased yields of raspberries and of late cauliflowers in most cases; irrigation increased total numbers of top grade bulbs and total weight of tulip, hyacinth, iris, gladiolus and daffodil bulbs, without affecting storage quality, or flowering quality in the greenhouse.

2304. Tysser, H. F. (Editor).
The Fruit Annual 1954-55.
British Continental Trade Press Ltd., Strand, London, pp. 503, illus., £1.

A new feature of this useful, office desk manual is the inclusion of an account of the various types of container used in different countries for packing fruit. Developments in mechanization in citrus orchards and packing sheds, pp. 53–67, is only one of the articles of practical value included.

2305. Wädenswil (Kobel, F.).
Jahresbericht 1952/1953 der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. **(Annual Report of the Wädenswil horticultural research station for 1952-53.)**
Landw. Jb. Schweiz, 1954, 3 (n.s.): 585-670, bibl. pp. 7, illus.

Breeding: breeding and selection of fruits, vines, strawberries, vegetables, primulas and hydrangeas. *Physiology:* mineral analysis of fruit trees, rooting of apple rootstocks, tests with "tomafix" to improve fruit ripening and size of tomatoes. *Plant protection:* fungicides and insecticides, entomology, diseases of fruit and vines, seed disinfection and soil sterilization, cucumber mildew. *Fruit and vegetable utilization:* storage trials with apples, pears and cherries, testing grading machines. *Pomology:* rootstock trials, training and pruning, nutrition, walnut propagation, spraying techniques, orchard costs, wound dressings. *Viticulture and oenology:* breeding, nutrition, rootstock and spraying trials at Wädenswil and elsewhere. *Market gardening:* variety trials with vegetables, cultural trials with *Erica gracilis*, hydrangeas and azaleas. [See also separate abstracts.]

2306. Wattle Research Institute, Pietermaritzburg.
Report of the Wattle Research Institute for 1953-54, pp. 57.

Papers on current research concern the following among other subjects: Effect of brushwood disposal—run-off and erosion during the first 2 years after clear-felling and regeneration; analytical problems in connexion with black wattle tannin; aerial spraying against the bagworm *Acanthopsyche junodi*. A useful note is given on the control of bramble by chemical weed-killers, in particular esters of 2,4,5-T.

2307. West of Scotland Agricultural College.
Report on the Work of the College for the year ended 30th Sept. 1954, 1954, pp. 61.

Notes are given on breeding tomatoes for resistance to *Cladosporium* leaf mould, sowing dates for tomatoes, national fruit trials at Auchincruive, and trials of early flowering chrysanthemums and of hyacinth varieties.

2308. Western Canadian Society for Horticulture.
Report of Proceedings of the Tenth Annual Meeting of the Western Canadian Society for Horticulture 1954, Saskatoon, Saskatchewan, 1954, cyclostyled pp. 122.

In addition to several papers abstracted separately in the sections on Deciduous Fruits and Floriculture these Proceedings included the following among a number of research committee reports and papers: (1) Report of the Fruits Committee on new varieties of fruits for the Prairie Provinces (pp. 21-9) with descriptions in some cases; (2) D. A. Rennie, Saving the soil in orchard practices (pp. 31-6, bibl. 14), a review with particular reference to the use of organic mulches; (3) H. R. Hikida, 2,4-D in the Winnipeg market garden area (pp. 83-4), giving observations on the increasing extent of damage to crops in relation to the very large acreage of field crops now being treated, notably with ester formulations; (4) R. H. Knowles, The relationship of the rest period and after-ripening to germination of the seeds of *Crataegus* (pp. 86-7, bibl. 5), a review; and (5) W. H. Cram, *Crataegus* and *Viburnum* breeding at Forest Nursery Station, Indian Head (pp. 89-90).

New periodicals.

2309. Departement van Landbouw, Suriname.
De Surinaamse Landbouw [*Surinaam. Landb.*], 1953, Vol. 1, Nos. 1 to 7, pp. 312, and 1954, Vol. 2, Nos. 1 to 5, pp. 221, bibls, illus., Surinam fl. 5 per year.

This journal now in its second year, appears bi-monthly. It is published by the Department of Agriculture, in conjunction with the Organization for the Development of Mechanized Agriculture. Articles are mainly concerned with agriculture in Dutch Guiana, and among crops that have so far received attention are pineapples, coffee, citrus, lemon grass and cacao.

2310. Instituut voor Tuinbouwtechniek, Wageningen.
Tuinbouwtechniek, Nr 2 (*Tuinbouwtech.*], Inst. Tuinbouwtech., S. L. Mansholtlaan 10, Wageningen, 1954, pp. 81, illus., fl. 2.

Following the success achieved by a 10-year jubilee publication with the same title issued in January, 1954 [see *H.A.*, 24: 1067], the Institute for Horticultural Engineering has decided to produce *Tuinbouwtechniek* regularly. No. 2 was published in December, 1954, and contains short technical articles by members of the staff on different aspects of mechanization as well as some extracts from trade papers published elsewhere.

2311. Kulturpflanze (Mansfeld, R., and others, Editors).
Die Kulturpflanze [*Kulturpfl.*], 1953, Vol. **1**, pp. 227, Akademie-Verlag, Berlin.

This annual journal bears the sub-title *Berichte und Mitteilungen aus dem Institut für Kulturpflanzenforschung der Deutschen Akademie der Wissenschaften zu Berlin in Gatersleben Krs. Aschersleben* (Reports and communications from the Research Institute of Cultivated Plants of the German Academy of Science, Berlin, at Gatersleben, nr. Aschersleben). The institute was founded in 1943 and transferred to Gatersleben in 1945 where it appears to be developing as the main centre of research on cultivated plants in Eastern Germany. The first volume of the journal is divided into 3 sections, which, respectively, give an account of the institute's history and report on the work of its many departments (pp. 7-52), present original papers [some of which are abstracted separately] (pp. 53-170), and conclude with the *Index seminum* (pp. 171-227).

2313. Junta de Exportação do Café, Lisboa.
Revista do Café Português [*Rev. Café portug.*], Vol. **1**, Nos. 1-3, 1954, 10×7 in., pp. 62, 76, 78, illus., Junta de Exportação do Café, Rua Augusta 27-3º-D, Lisbon, Esc. 40 per vol.

This new quarterly journal sets out to promote the consumption of Portuguese coffee, an important item in the economy of metropolitan Portugal and the overseas territories of Angola, Timor, Cape Verde and San Tomé, and to disseminate information on culture and processing. Each issue contains 3–5 papers and other features including a growers' advisory notebook, Coffee Export Association topics and export and price statistics.

2313. NATIONAL PUBLICATIONS, KARACHI.
Pakistan Review of Agriculture [*Pakistan Rev. Agric.*], 1954, Vol. **1**, Introductory Number and No. 2, pp. 38 and 48, illus., Merwanjee B. Dulal, Adamjee Chambers, McLeod Road, Karachi, Rs. 6 per annum.

Each of the first 2 issues of this handsomely illustrated, quarterly journal contains about 8 articles. These include several of a rather general nature on subjects connected with horticulture and plantation crops, for example, "Sugar—Retrospect and Prospect" and "Mycological and Plant Pathological Research in Pakistan".

Noted.

2314.

a ADEN PROTECTORATE.
Annual Report of the Department of Agriculture for 1953, 1954, pp. 12, Sh. 3.50.

b AUSTRALIA.
Thirtieth Annual Report of the Commonwealth Dried Fruits Control Board for year 1953-54, Melbourne, 1954, pp. 20.

c AUSTRALIA.
Twenty-eighth Annual Report of the Australian Canned Fruits Board for the year 1953-54, Melbourne, 1954, pp. 34.

d CYPRUS (JONES, D. K.).
Annual Report of the Cyprus Department of Agriculture for 1953. Annexure III. Annual Report of the Agricultural Officer (Research) for 1953, 1954, pp. 30.

e FIJI.
Annual Report of the Fiji Department of Agriculture for 1953, 1954, pp. 52.

f INDORE INSTITUTE OF PLANT INDUSTRY (SETHI, R. L.).
Progress Report of the Indore Institute of Plant Industry for the year ending 31st May 1954, pp. 62.
Mainly field crops, but includes work on sugar cane and vegetables.

g JAMAICA.
Annual Report of the Department of Agriculture, Jamaica, 1952, 1953, pp. 41, 3s.
See also *H.A.*, 24: 836.

h MULLENDERS, W.
La végétation de Kaniama (Entre-Lubishi-Lubilash, Congo belge). (**The vegetation of Kaniama, Belgian Congo.**)
Publ. Sér. sci. INEAC **61**, 1954, pp. 499, bibl. 189, illus.
Physical and biotic environment (72 pp.), flora (42 pp.) and vegetation (347 pp.).

i ST. KITTS-NEVIS-ANGUILLA.
Annual Report of the Agricultural Department, St. Kitts-Nevis-Anguilla for the year 1953, 1954, pp. 36.
Including variety, manurial and tillage trials on sugar cane.

j TÄCKHOLM, V., AND DRAR, M.
Flora of Egypt. Vol. III. Angiospermae, part Monocotyledones: Liliaceae—Musaceae.
Bull. Fac. Sci. Cairo Univ. **30**, 1954, pp. 644, bibls numerous.

k UNIVERSITY OF WESTERN AUSTRALIA (UNDERWOOD, E. J.).
Report Institute of Agriculture, Nedlands, W.A., for the period 1949-53, pp. 68.
Plant research concerns pasture crops.

l U.S. DEPARTMENT OF AGRICULTURE.
Report of the Secretary of Agriculture 1953, U.S. Govt Printing Office, Washington, 1954, pp. 58, 25 c.

m ZANZIBAR.
Supplement to the Annual Report of the Zanzibar Department of Agriculture, 1953. Results of field experiments, crop and stock records and other statistics, 1954, pp. 7, Sh. 1/50.